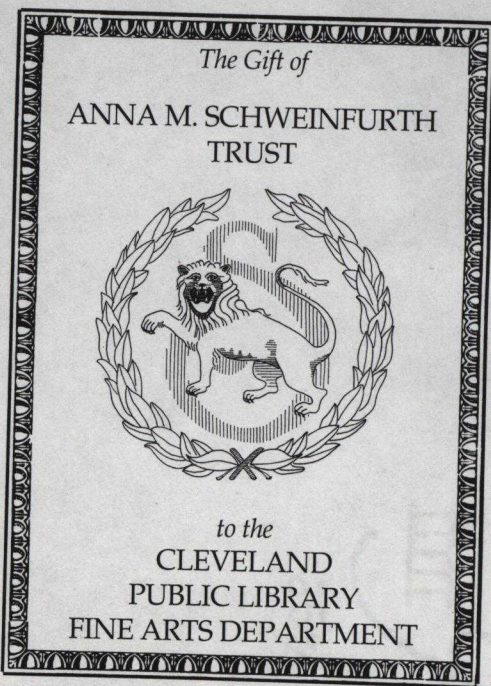




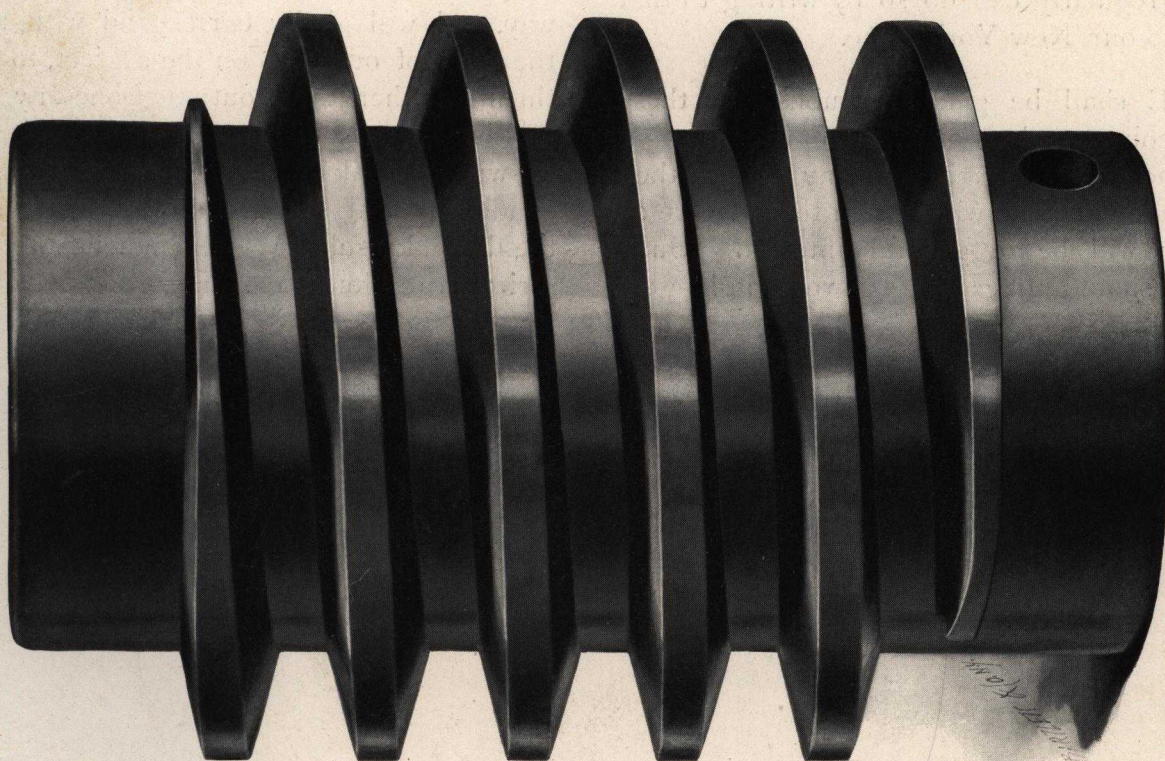
PROGRESS REPORTER



NILES - BEMENT-POND CO.
136-138 LIBERTY ST., NEW YORK.

APRIL, 1904

No. 1



STEEL WORM, $3\frac{3}{8}$ INCHES DIAMETER, $4\frac{1}{2}$ INCHES LONG

STEEL WORM CUT IN SIXTEEN MINUTES ON PRATT & WHITNEY THREAD MILLER

The above cut is a full-sized reproduction of a steel worm $3\frac{3}{8}$ inches in diameter by $4\frac{1}{2}$ inches long, the thread of which was cut on a Pratt & Whitney Thread Milling Machine

in sixteen minutes by the watch. If this result is compared with the best lathe work it will be found interesting. We will be glad to hear from our friends on this subject.



PROGRESS REPORTER

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NILES-BEMENT-POND COMPANY, NEW YORK

APRIL, 1904

No. 1

THE PROGRESS REPORTER will be issued by the Niles-Bement-Pond Company every few weeks as interesting new matter accumulates.

The object of the publication is to keep the employes of the company, and the public generally, informed as to the new machines and devices which are constantly being brought out.

Any of our customers, or their employes, or our friends generally, who may desire to receive copies regularly can do so by writing to that effect to our New York office.

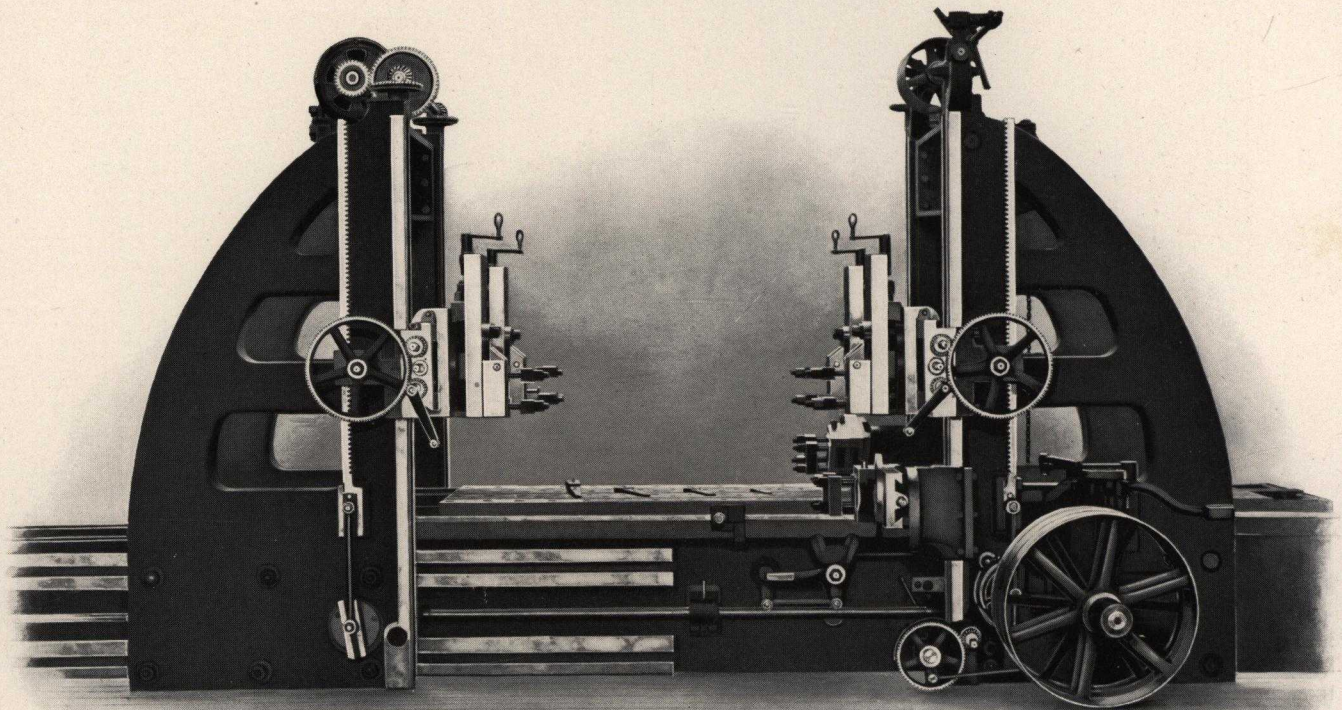
WE shall be glad to publish in these columns short articles from those using our machinery, referring to any results they may have obtained, which from their nature or novelty will be of general interest. Such articles should not exceed 350 words in length;

the shorter the better, if they cover an interesting point clearly.

WE frequently find, in visiting the shops which are largely equipped with our machine tools, great discrepancies in the results obtained in their output.

When machines of identically the same size and pattern, and on the same class of work, turn out from 25 to 40 per cent. more work in one shop than in another, something is clearly wrong. We naturally feel it our duty and to our interest to assist our customers in obtaining the greatest output possible from any of our machines.

We have data on hand as to what each machine ought to do when handled in the best way, and will gladly correspond with any of the users of our tools on the subject, to advise them whether their output from any given tool is as good as it should be; and if it is not, we will most likely be able to point out such conditions that should be changed to obtain the desired result. We recommend this to the serious attention of customers.



1263

48-INCH DOUBLE PLANER

48-INCH DOUBLE PLANER

A very interesting tool is shown in figure on opposite page which illustrates our standard 48-inch Pond Planer with the exception that the bed has been prepared to receive a second pair of uprights. The feed mechanism is common to both sets of uprights. The arrangement of the bed for holding this extra pair of uprights is such that it can be moved to different positions on the bed for different lengths of work.

This type of planer was designed for, and has been used largely in railway and engine building shops for planing the ends of connecting rods. It is a time-saver for this class of work. Keeping both pairs of uprights as near together as possible, the time lost between the points of the tools is less than the time lost in running back on a standard planer, practically doubling the capacity.

60-INCH DOUBLE ROTARY PLANER

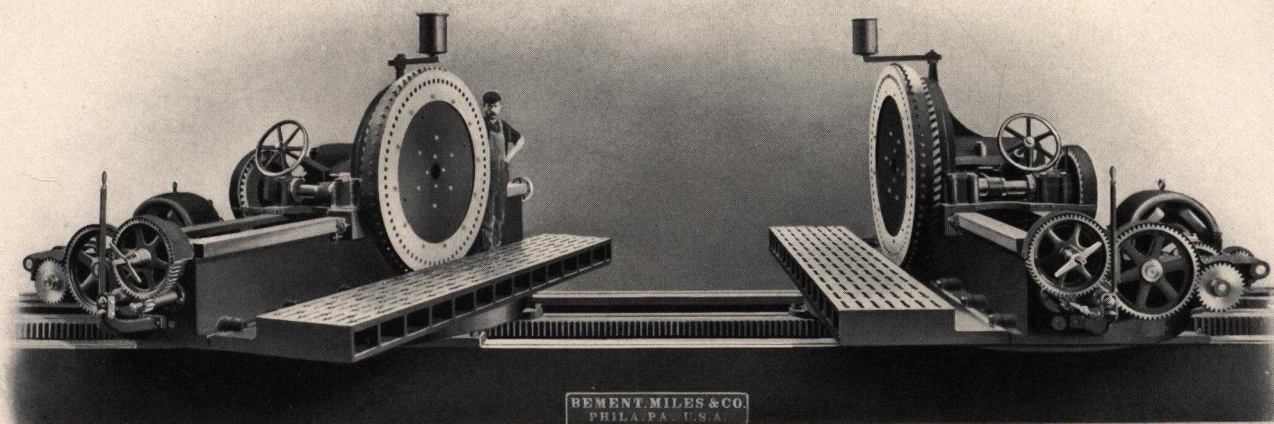
The cut below shows a Double Rotary Planing machine which is especially designed for bridge and structural steel shops, for facing off the ends of long columns, girders, etc. It consists of

two 60-inch rotary planers mounted upon a wide box bed which can be made of any length to suit requirements. The photograph shows both planers movable along the bed, but the usual construction is to have one fixed near the end of the main bed and the other to have a quick power traverse in either direction by means of a rack and pinion for readily adjusting the distance between the face plates.

In this case each head has 7 feet traverse on its individual bed, three changes of power feed and rapid power movement in either direction, and being mounted on a swiveling base may be revolved 90 degrees each way from the square position for angular cutting.

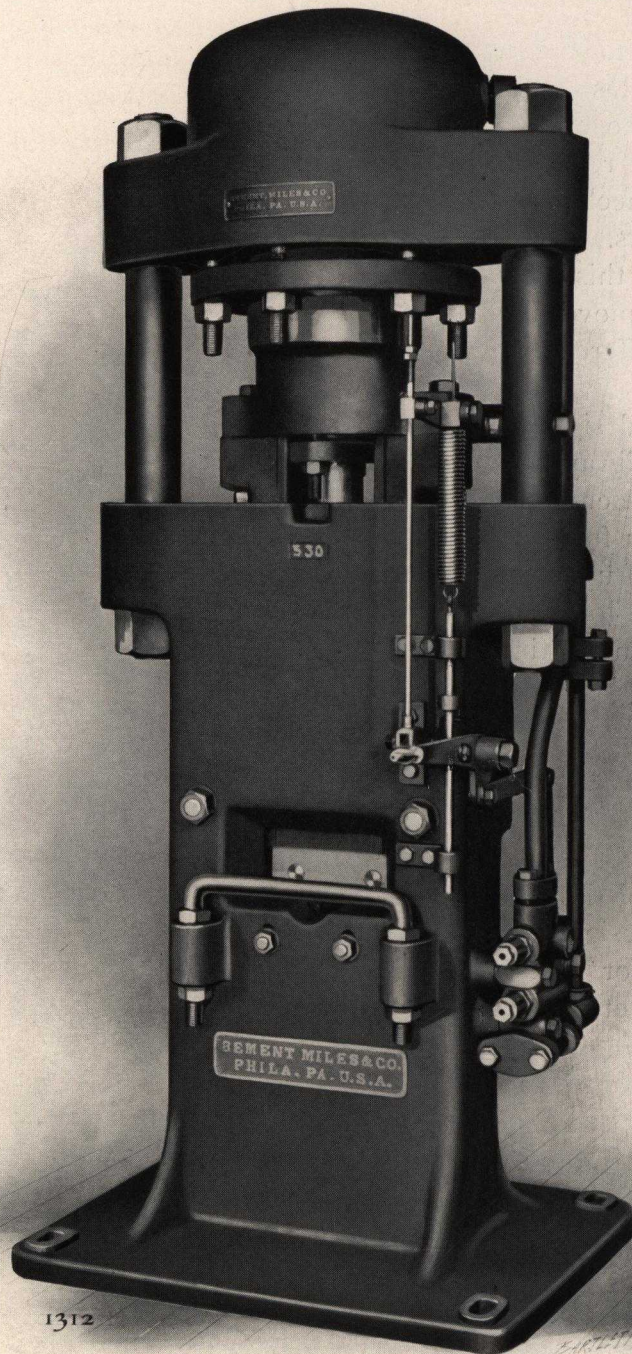
The diameter of the cutter-heads is 5 feet. The heads have slots to accommodate sixty-eight tools of $1\frac{1}{4}$ -inch square steel, these being held in position by set screws threaded through steel rings shrunk on outside periphery of the heads. For varying the depth of cut, the cutter-heads have an in and out adjustment of 3 inches.

Each head is independently driven by a 20-horse-power motor, mounted on the machine's individual bed and directly geared to the cutter-bars, making it independent in every respect.



1316

60-INCH DOUBLE ROTARY PLANER



HYDRAULIC BAR SHEAR

HYDRAULIC BAR SHEAR

Numerous new and original features and radical departures from former patterns of similar machines have been incorporated in our new No. 5 Hydraulic Bar Shear made at our Bement-Miles Works and shown above. All the features that hydraulic machinery carries with it are embodied in this machine,

the most important being the impossibility of crowding it above its capacity.

The machine is so arranged that it shears a bar and returns to the top of the stroke automatically with a single movement of the lever.

The piston is $13\frac{1}{4}$ inches in diameter, giving 90 tons, at 1500 pounds per square inch water pressure, which is sufficient for cutting round bars 2 inches in diameter. The stroke

of the machine is $2\frac{1}{2}$ inches. Blades may also be applied to this machine when desired for shearing flat bars or angles. To insure against leakages hemp packing is used in all stuffing boxes, including the valve, there being no leather packing used whatever.

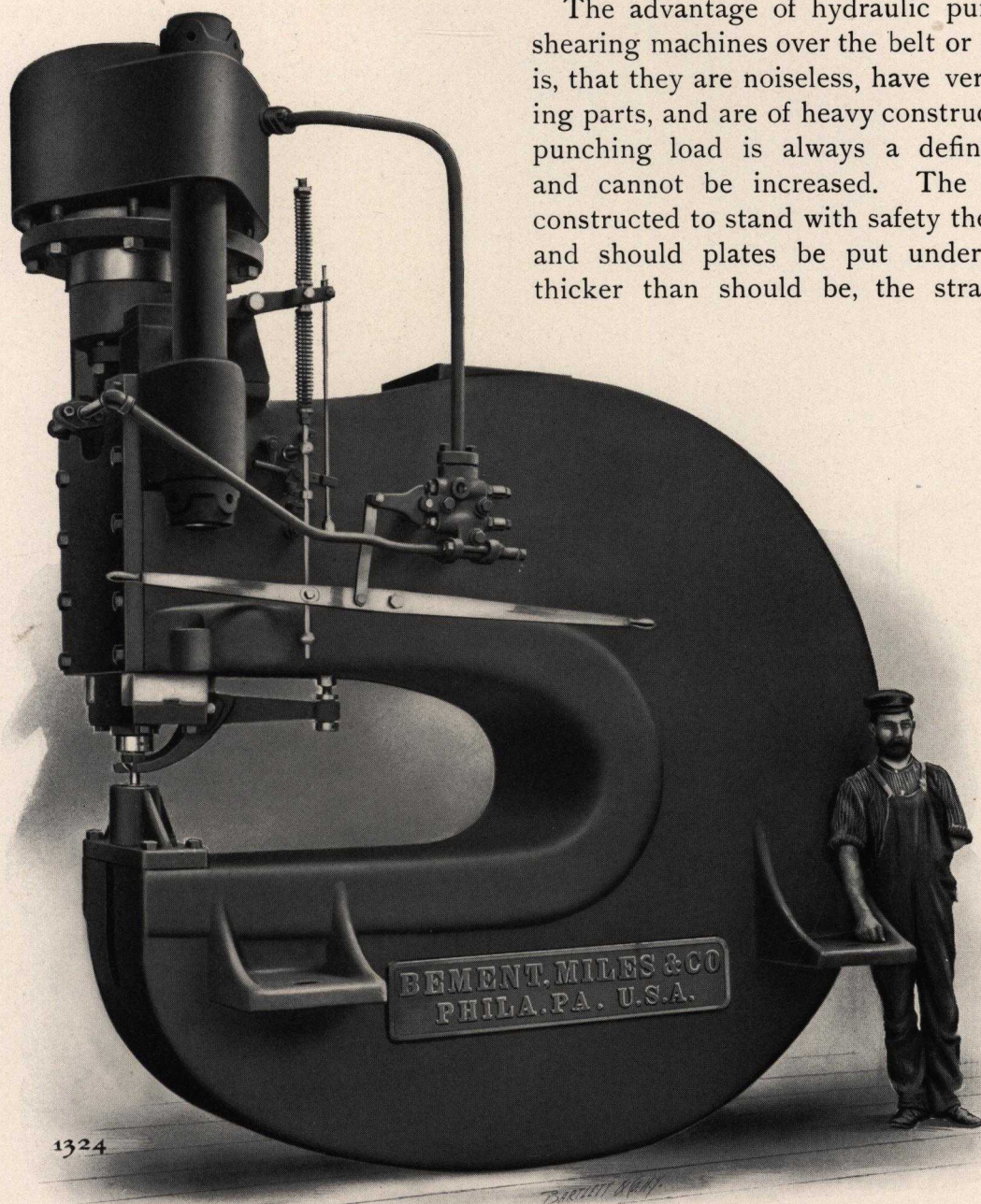
A NEW HYDRAULIC PUNCHING MACHINE

We are now building at our Bement-Miles Works a Quick-acting Automatic Hydraulic

Punch which is illustrated below. It has a capacity of $1\frac{1}{2}$ -inch hole through $1\frac{1}{4}$ -inch plates. It is also provided with a set of shear blocks for cutting $1\frac{1}{4}$ -inch steel plates.

The valve-controlling mechanism is made so that the head descends by means of water pressure and automatically returns to top of stroke and stops, or by a slight adjustment, runs automatically. The return of the punching head is by hydraulic pressure, this cylinder being placed within the head and behind the cover at the front.

The advantage of hydraulic punching and shearing machines over the belt or motor drive is, that they are noiseless, have very few wearing parts, and are of heavy construction. The punching load is always a definite amount and cannot be increased. The frames are constructed to stand with safety the capacities, and should plates be put under the punch thicker than should be, the strains on the



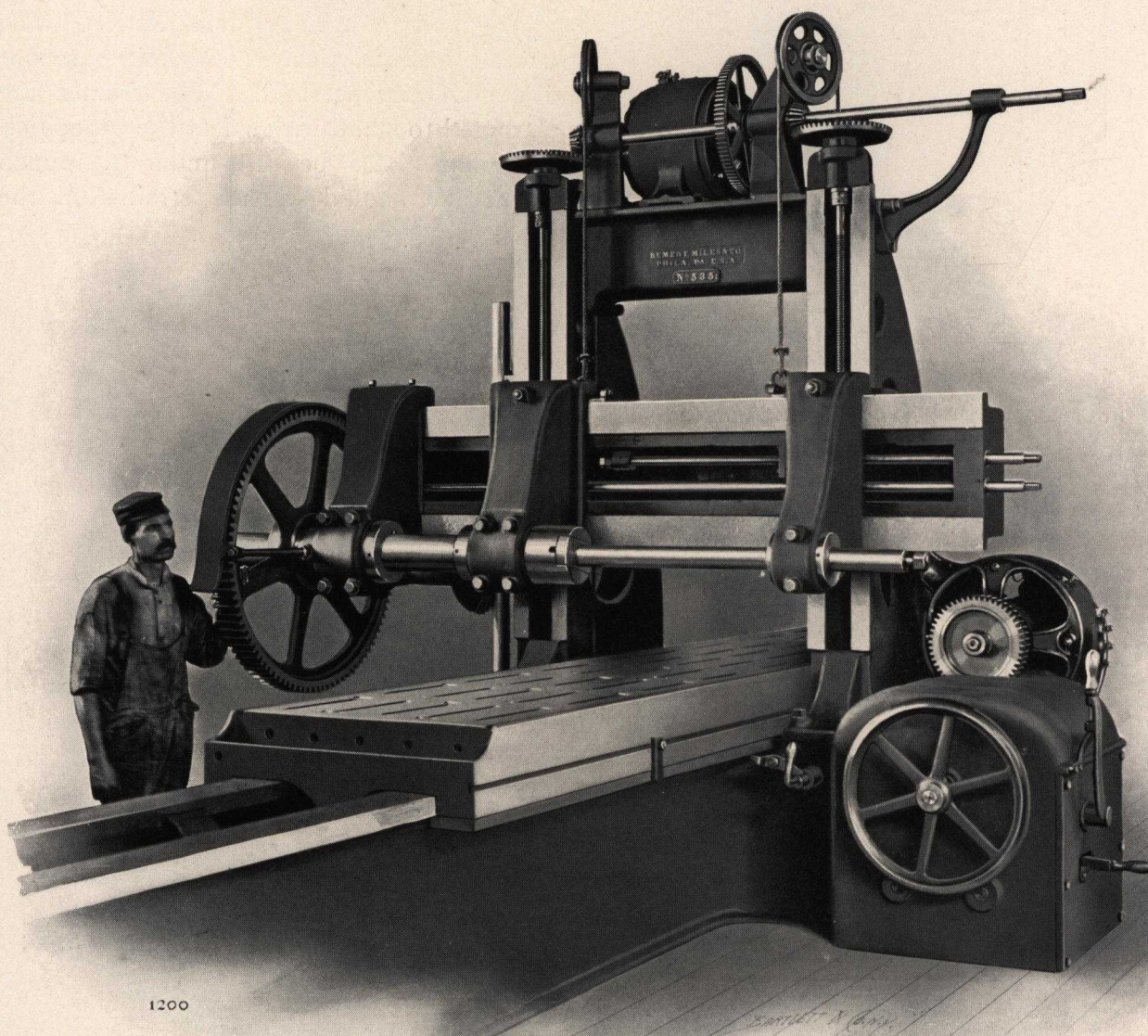
1324

HYDRAULIC PUNCHING MACHINE

frames could not be increased, on account of the pressure being a fixed quantity. This is not the case with power-driven machines. With large revolving fly-wheels and gears, should material be put between punches or shears of greater capacity than the machines were designed for, the resistance of the punch would exert strains upon the frame equivalent to the power in the revolving parts, and as a result, probably cause some breakage. The hydraulic machine is therefore not apt to be broken by using it for work beyond its capacity.

HORIZONTAL MILLING MACHINE

This machine, illustrated below, is our new Bement-Miles No. 6 Horizontal Slab Milling Machine, having some special features with regard to drive. There are three motors on the machine, one of 20 horse-power for driving the milling tool, which is placed on the off side and not seen in the figure because it is hidden by the bed, also one of 5 horse-power attached to the side of the post for feeding. This motor has speed regulation, which, in conjunction with changes by gears, gives a large variation of



HORIZONTAL MILLING MACHINE

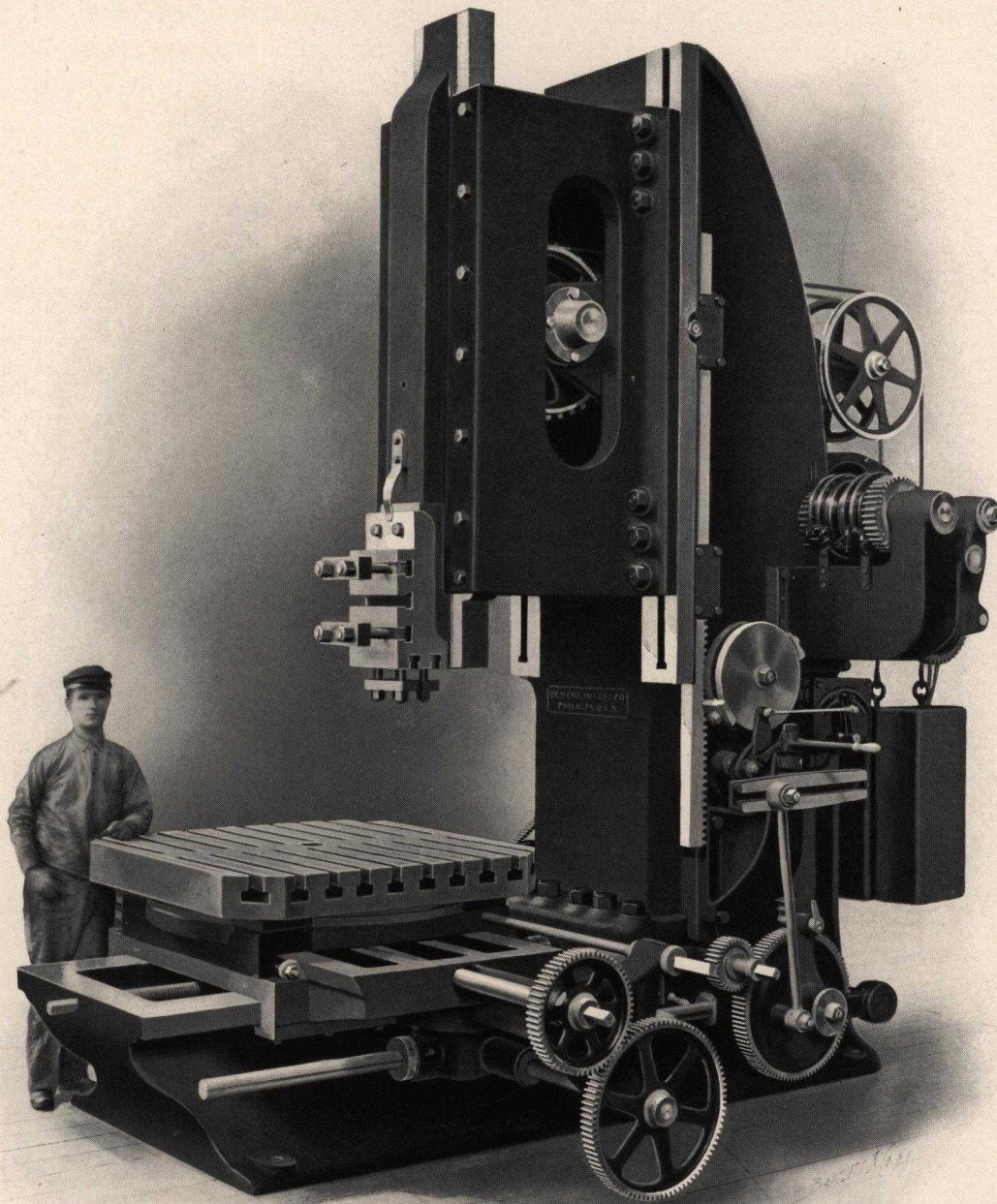
T H E P R O G R E S S R E P O R T E R

feeds for the table. Instead of the mechanical power lift on the top of the tie piece for the cross-rail, there is mounted a 3-horse-power motor directly geared to the lifting screws.

The distance between housings is $37\frac{1}{2}$ inches. The table is 34 inches wide and may be made of any desired length; it has positive power feeds and rapid power traverse in either direction. The spindle is of large diameter and runs in long bearings. These bearings, as well as the outer support for mandrel, are

adjustable along the cross-rail, giving rigid support under heavy cuts by bringing them close together. The cross-rail has in addition to power-elevating and lowering fixtures, fine hand adjustment and is counterweighted.

This machine is especially designed for very heavy work, such as is encountered in railroad shops. It is made for the most exacting requirements of the new high-speed tool steels to withstand the heaviest cuts, having a very heavy construction, strength and rigidity. The bed



1178

68-INCH SLOTTING MACHINE

is extra deep and is securely braced by heavy cross girders of box construction spaced at equal intervals. The table is heavily built and has "T" slots for clamping down work. It travels on flat ways and is very heavily gibbed its entire length.

The use of slab milling machines in railroad shops has increased considerably where the object has been to secure increased outputs. It is a most efficient and rapid machine for work such as the milling of side rods for locomotives and other large forgings of steel.

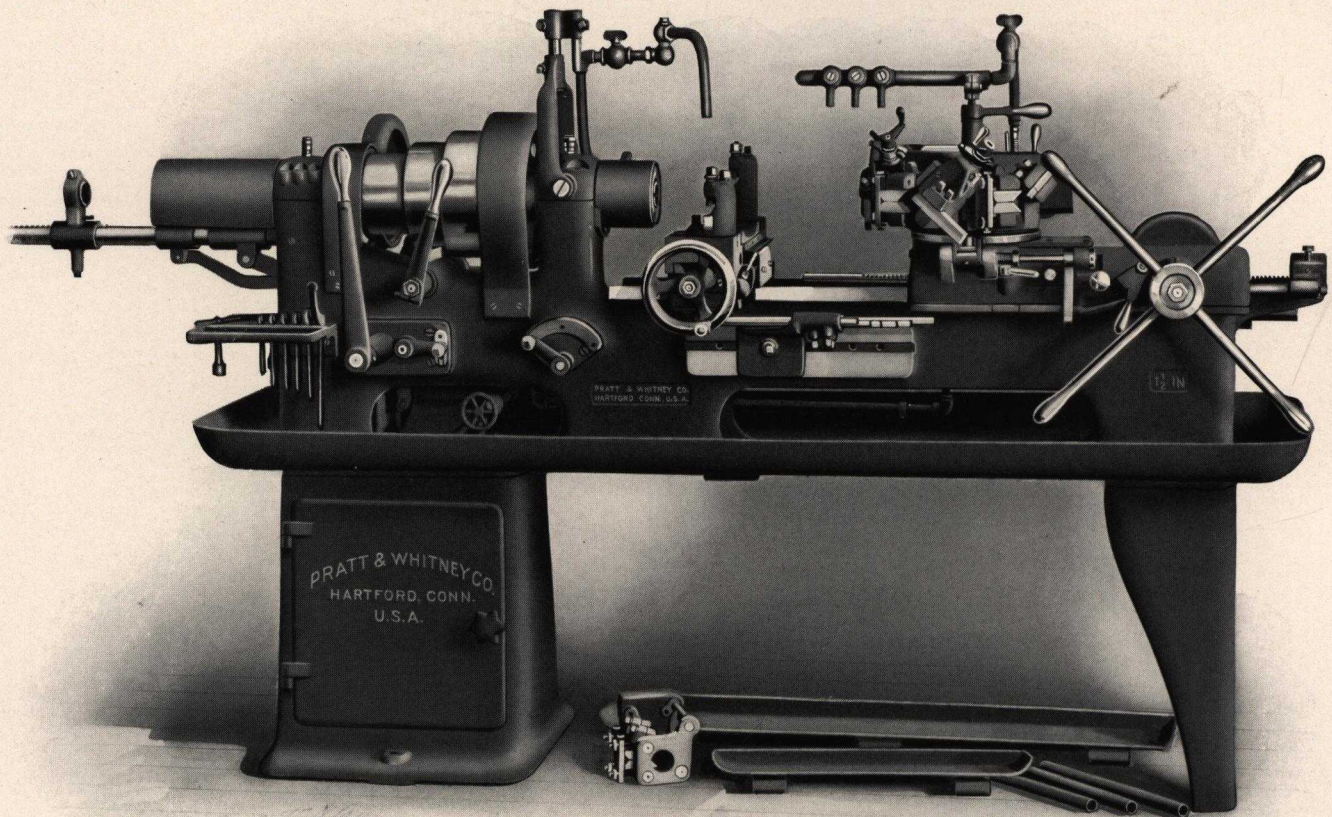
We will be pleased to furnish more data or information of this machine.

68-INCH GEARED SLOTTING MACHINE

The feature of this machine, which is shown on page 7, is that it is driven by a 20-horse-power constant speed motor, directly geared to the cutter-bar, through magnetic clutches.

The cutter-bar bearing has vertical adjustment on the frame to suit work of varying heights.

The actual stroke is 68 inches; distance from front of tool apron to frame 44 inches, and maximum distance from guides to table 55



1 1/2 X 18-INCH NEW MODEL TURRET LATHE

PRATT & WHITNEY TURRET LATHE

The above half-tone shows our new 1 1/2 x 18-inch Turret Lathe, which has recently been finished at our Pratt & Whitney works. Our Turret Lathes are now built in five sizes, for taking rod work, as follows: 5/8 x 4 1/2-inch, 1 x 10-inch, 1 1/2 x 18-inch, 2 x 26-inch and 3 x 36-inch.

inches. The table, which is 54 inches square, has longitudinal and cross traverse of 60 inches, besides a circular movement. The feeds are all actuated by hand or power in either direction.

The cutter-bar, which is counterweighted, is provided with a spring tool relief apron and may be adjusted for any length of stroke up to its maximum.

ELEVATING DEVICE FOR HYDRAULIC WHEEL PRESS

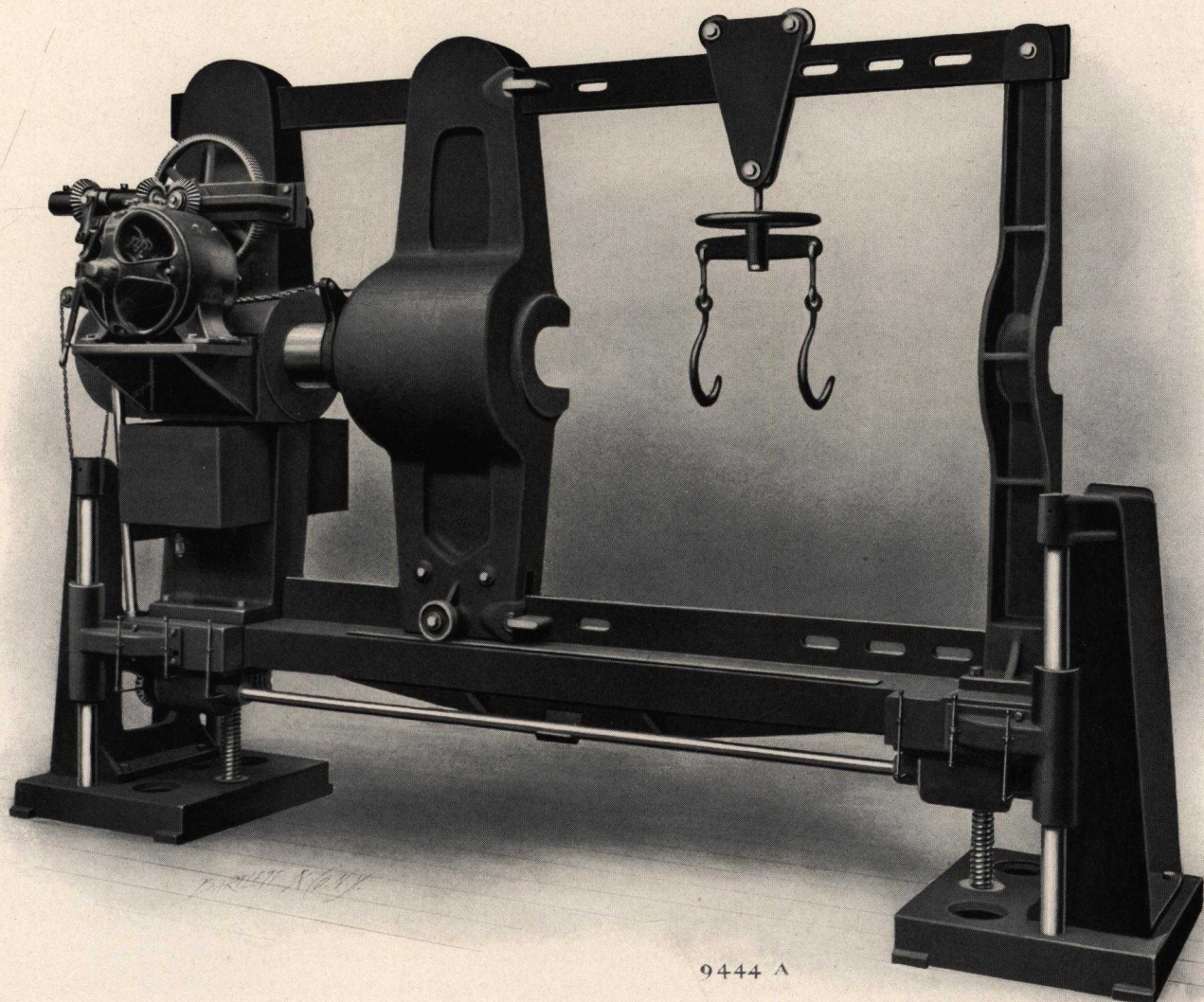
The accompanying half-tone shows our Niles 400-ton Hydraulic Wheel Press with motor drive. The feature of this machine is the Gordon Patent Elevating Mechanism, the entire machine being carried by two screws which permit of elevating it to any desired height above the floor, making possible the rolling into position of any size wheels without raising them above the floor, thus doing away with the necessity of handling by means of crane.

This elevating device enables a driving wheel press to be used for forcing on car wheels with equal convenience.

The motor which drives the pumps is also used for operating the elevating screws. The

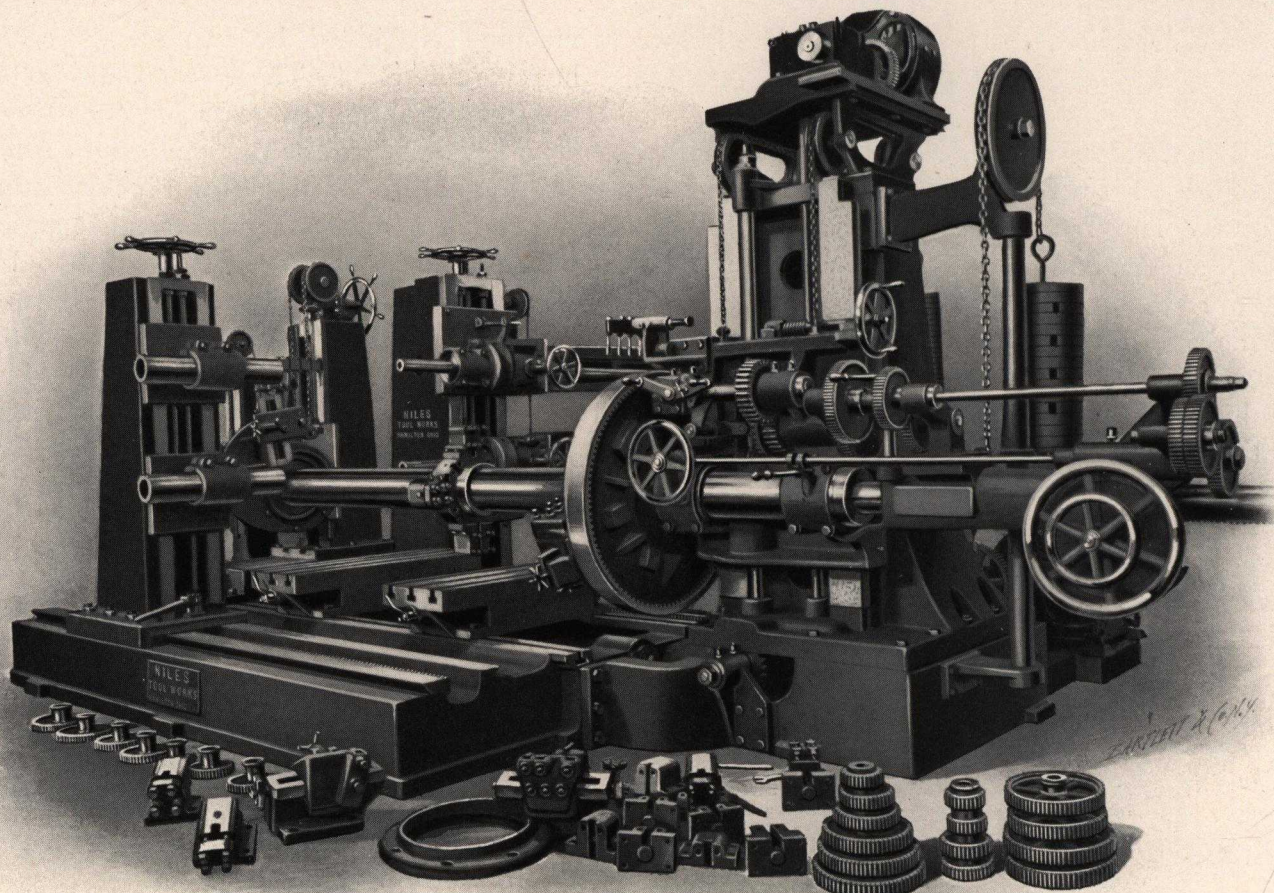
machine is guided by two stands carrying heavy guide rods. These stands are bolted to the foundations. No gears for operating the elevating screws are running unless the machine is being raised. A single lever instantly throws the elevating mechanism in or out of action.

The cylinders of our presses are bored true and lined with copper expanded into place and burnished. The pistons are packed with the best cup-leather, are tight, durable and cause little friction. The pumps are double acting, have two sizes of plungers and three speeds of delivery, which are under instant control. The delivery may be instantly stopped by trip-valves. The safety-valve can be set to open at any desired pressure. The pressure gauge is graduated for tons of pressure, and for pounds per square inch, on the ram.



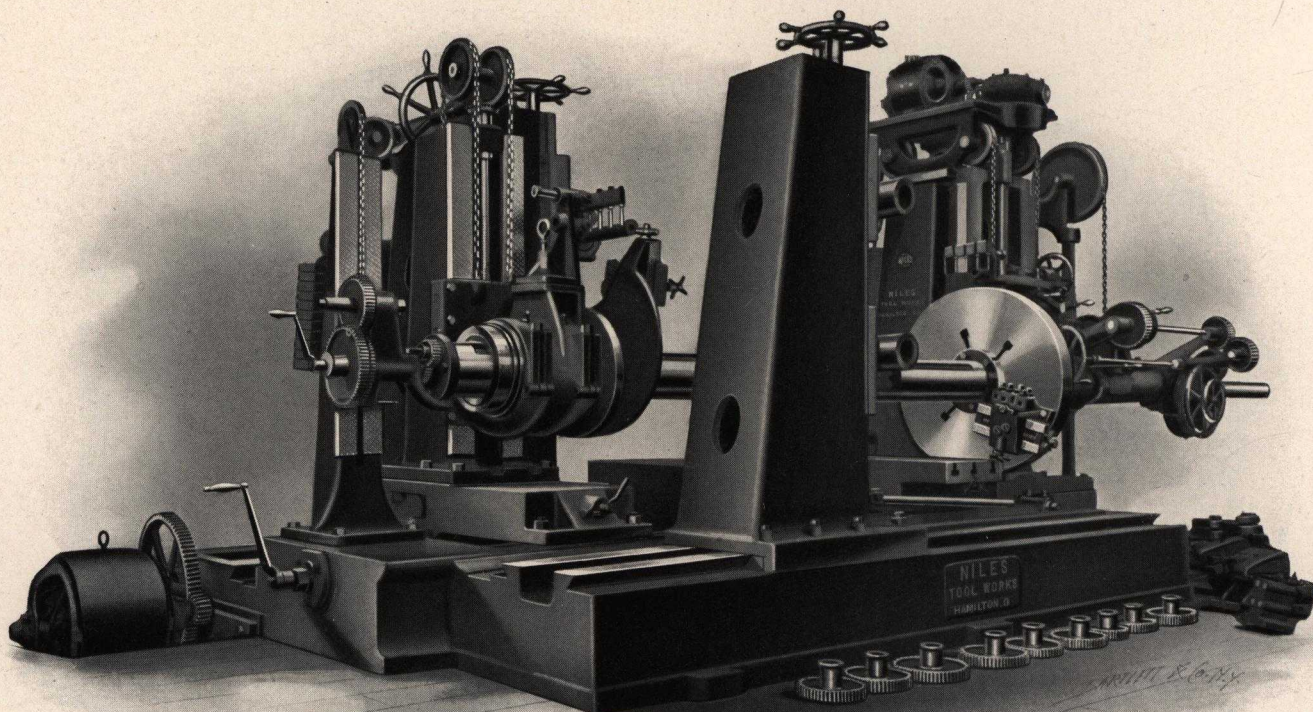
9444 A

400-TON HYDRAULIC WHEEL PRESS



9899 A

FRONT VIEW



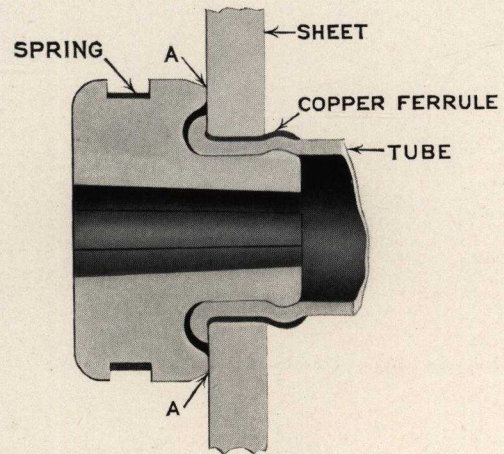
9899 B

CORLISS CYLINDER BORING MACHINE

CORLISS CYLINDER BORING MACHINE

The cuts on the opposite page show our new motor-driven Corliss Cylinder Boring Machine. This is a magnificent tool, having double port-boring attachments for cylinders ranging from 8 inches to 32 inches in diameter and lengths ranging from 46½ inches to 7 feet 9 inches. The upper half-tone shows the front of the machine with the elevating motor in position and numerous facing heads, rings and gears in front on the floor. The lower one illustrates the special planetary feed arrangement for the main bar, and also the motor for driving the port boring tool.

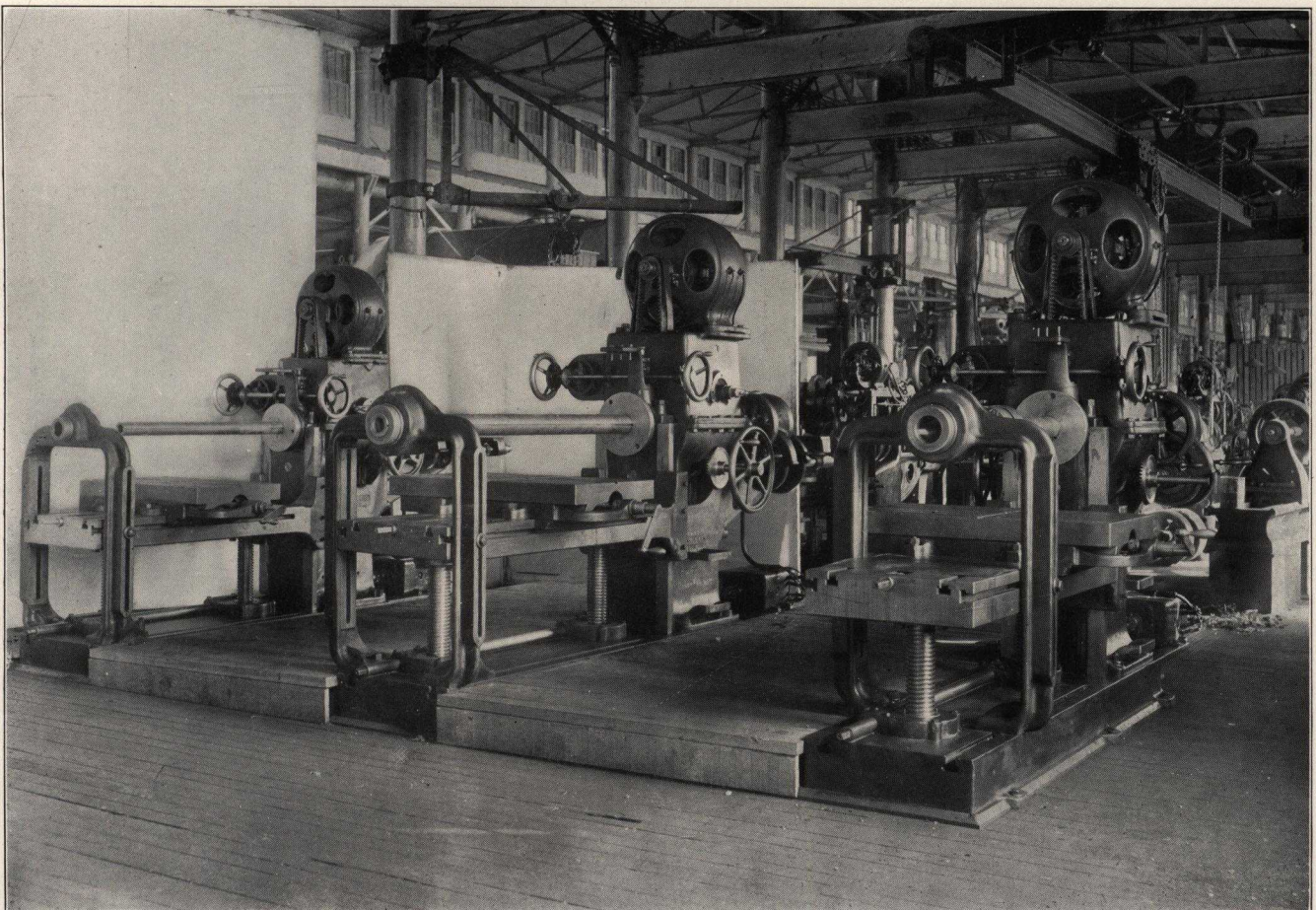
sheets; it is an improvement over the old style. The flange *AA* comes up against the face of the sheet and acts as guide for the proper loca-



IMPROVED FLUE BEADING TOOL

This new tool, of our Pratt & Whitney design is used for beading the inside of boiler tubes after the latter have been rolled tight in the

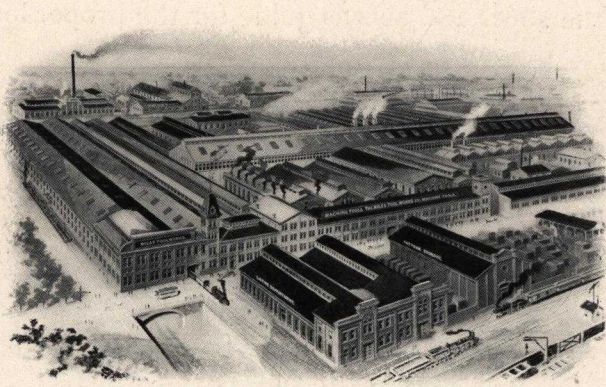
tion of the bead, keeping the latter at an exact distance from the sheet at all points and giving a more perfect bead than is possible to obtain otherwise.



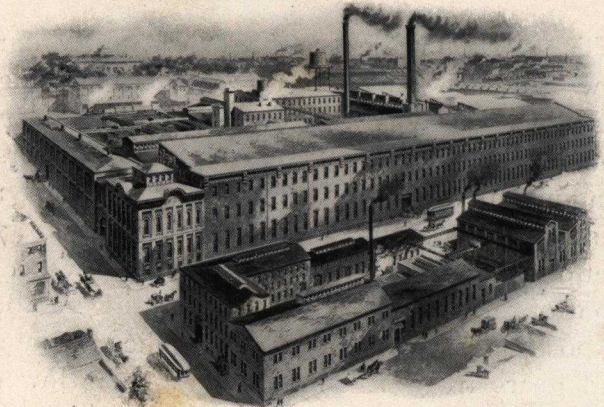
THREE MOTOR-DRIVEN HORIZONTAL BORING MACHINES INSTALLED IN THE WORKS OF THE CROCKER-WHEELER CO., AMPERE, N. J.

NILES-BEMENT-POND COMPANY

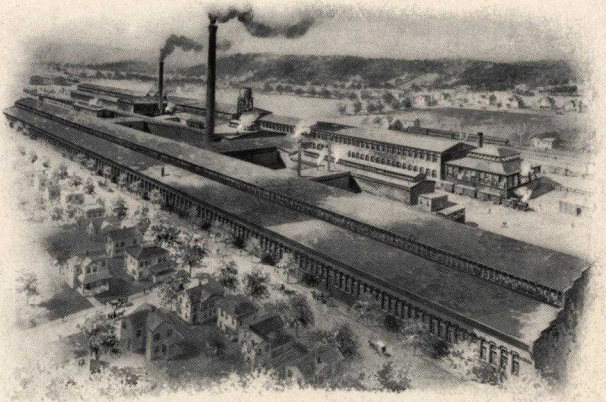
NEW YORK



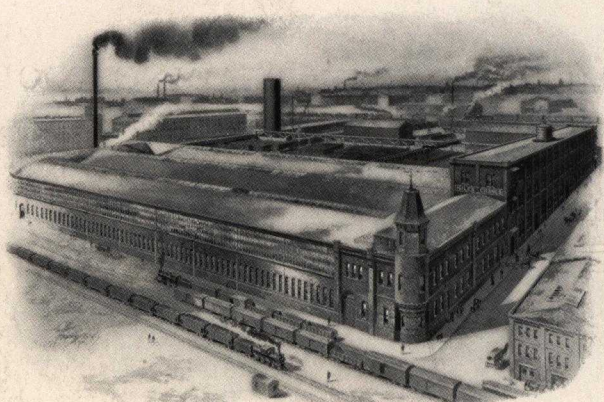
Niles Tool Works, Hamilton, Ohio. Floor space, 356,000 square feet



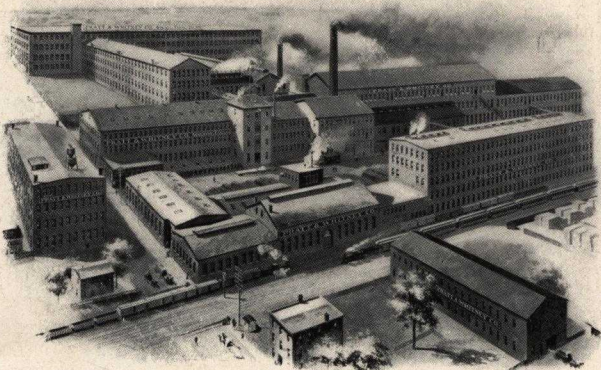
Bement-Miles Works, Philadelphia, Pa. Floor space, 217,800 square feet



Pond Machine Tool Works, Plainfield, N. J. Floor space, 217,000 square feet



Niles Crane Works, Philadelphia, Pa. Floor space, 360,600 square feet



Pratt & Whitney Works, Hartford, Conn. Floor space, 374,280 square feet



Small Tool Department, Pratt & Whitney Works, Hartford, Conn.

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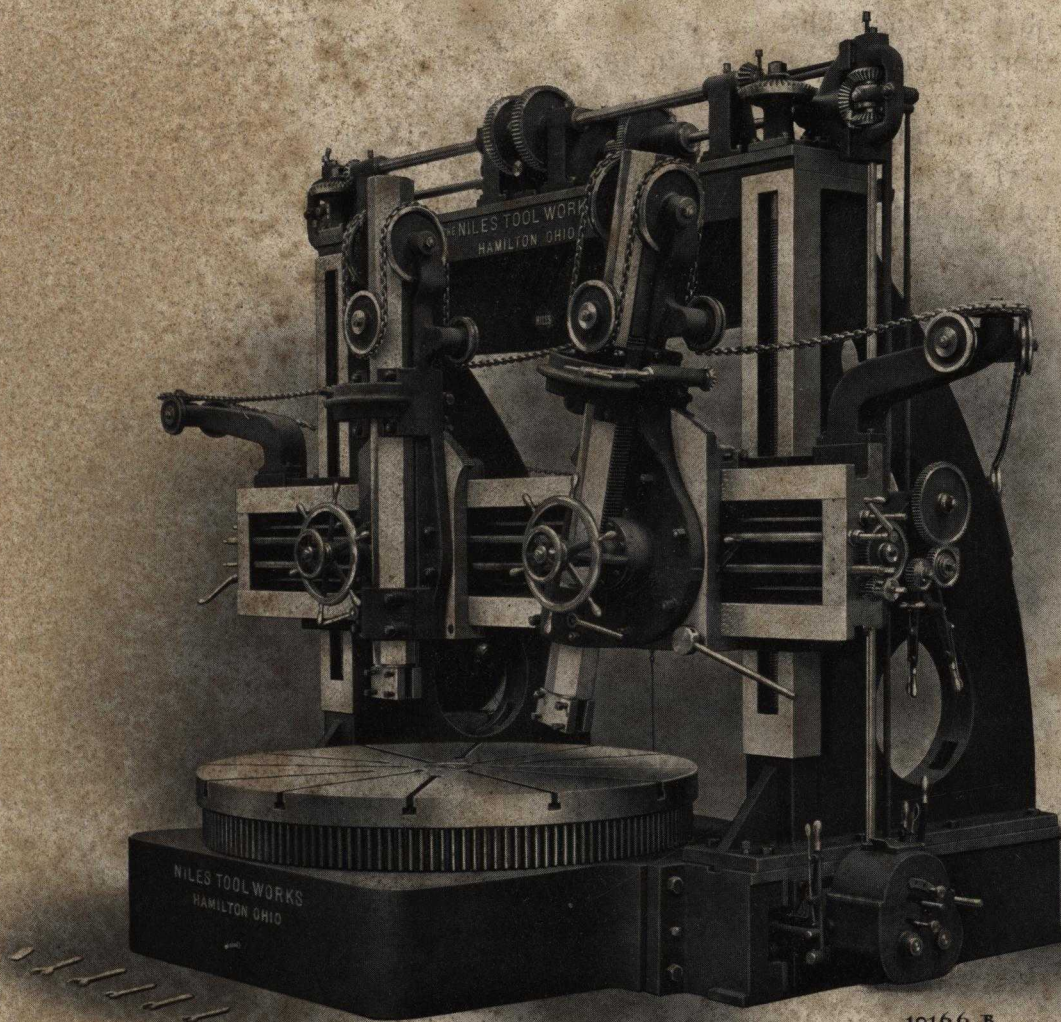
PROGRESS REPORTER



NILES - BEMENT-POND CO.
136-138 LIBERTY ST., NEW YORK.

MAY, 1904

No. 2



NEW 10-FOOT MILL FOR USE OF HIGH-POWER TOOL STEEL

PROGRESS REPORTER

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NILES-BEMENT-POND COMPANY, NEW YORK
LONDON, 23-25 VICTORIA STREET, S. W.

MAY, 1904

No. 2

THE PROGRESS REPORTER will be issued by the Niles-Bement-Pond Company every few weeks as interesting new matter accumulates.

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WE shall be glad to publish in these columns short articles from those using our machinery, referring to any results they may have obtained, which from their nature or novelty will be of general interest. Such articles should not exceed 350 words in length.

HARD STEEL CHIP

The chip shown in cut is actual size, the weight being $16\frac{1}{8}$ ounces. It was taken on a powerful 90-inch Niles Lathe at the Midvale Steel Works in Philadelphia, being simply picked up from a large number of such chips lying about the machine, the work in progress being the turning of a heavy gun forging.

The grade of steel used in these forgings is one of the toughest and hardest known to engineering practice.

In color these chips are a dark blue on the thick edge, tapering off to a straw color temper on the thin side, and falling from the tool these chips are so hot that many of them would set fire to a piece of wood.

This is simply shown as an illustration of the wonderful progress that has been made possible in machine tools by the introduction of high-power cutting steel. The high temperature at which the modern tool will retain its cutting edge is most surprising. The tool used in this case was of Midvale steel.



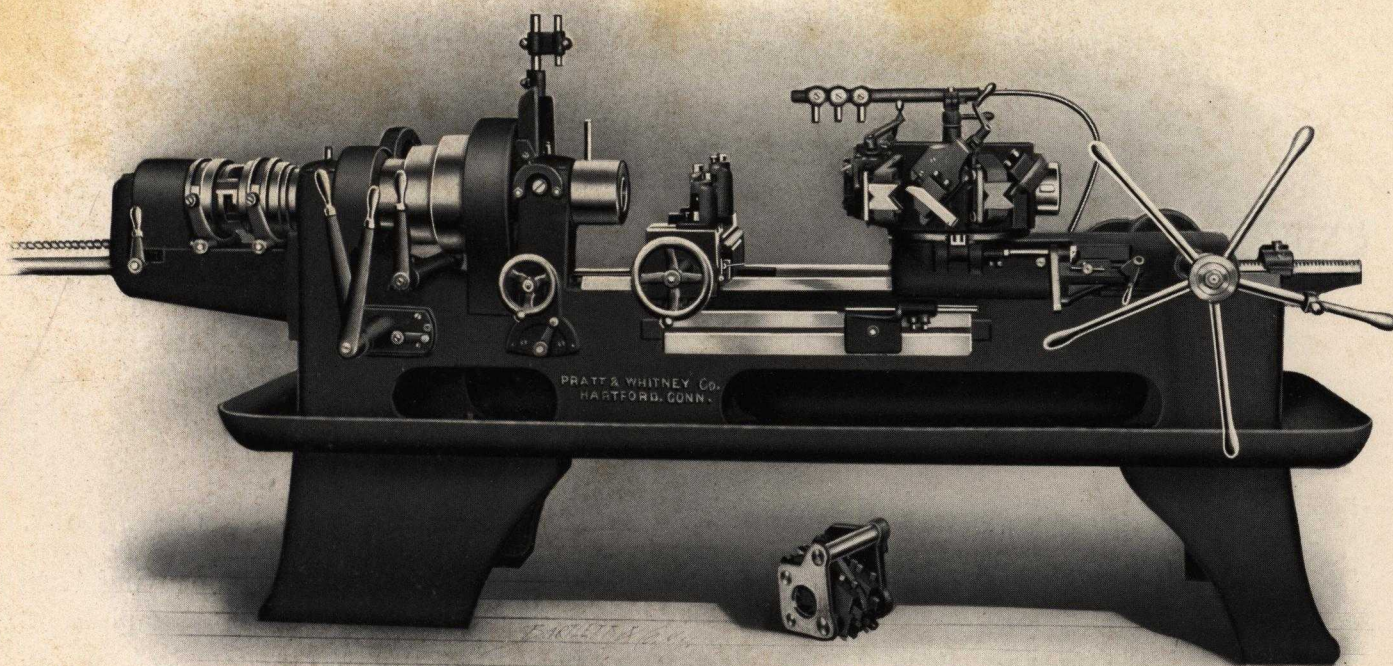
HARD STEEL CHIP (EXACT SIZE)

3 x 36-INCH TURRET LATHE

The half-tone shows the new model 3 x 36-inch Pratt & Whitney Turret Lathe.

The spindle of this machine will take rough stock up to 3 inches in diameter, and will do work 3 feet long. Our newly-designed and patented collet or chuck, which is incorporated in this machine, will handle stock 3-32 inch over and 1-32 inch under size—a very important point never successfully accomplished before.

to easy contact with the stock stop. The stock stop swings down from the head stock, and when not in use is entirely out of the way. This machine is provided with a double cross slide with two tool posts, which is movable along the bed to any desired location between the head stock and the turret slide. The cross-slide tools are capable of vertical and angular adjustment, and are secured in place by heavy set screws. Both the cross slide and turret slide have four changes of positive



3 x 36-INCH TURRET LATHE

This improvement enables the turret lathe to use rough stock, which by reason of its cheapness in comparison with the cold-rolled article, gives the turret lathe a still further advantage. The turret stop mechanism is the same in general design as those used on our smaller sized machines. It is located in the front of the lathe, protected from dirt and chips, and has independent stop for each turret tool. The power rod feed mechanism has no delicate parts to get out of order, and advances the rod

power feed in each direction, the handles for changing the feeds being conveniently located. The turret may be indexed back and forth by hand between any two holes without turning it through a complete revolution. It is automatically locked directly under the tool in use by a heavy tool-steel locking bolt.

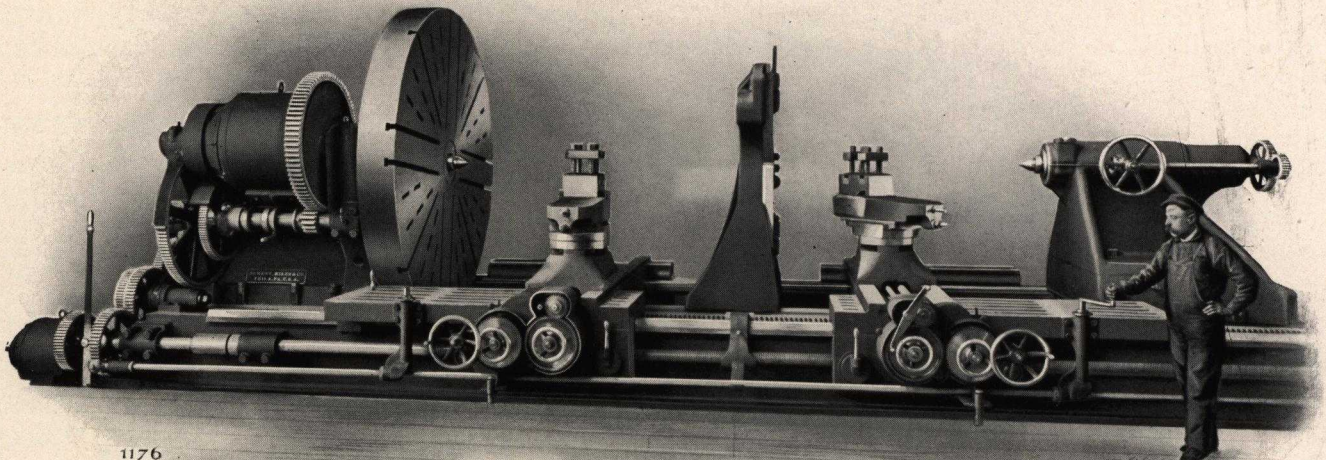
This machine is very much the heaviest and most powerful turret lathe ever put upon the market for rod work.

108-INCH BEMENT LATHE ELECTRICALLY DRIVEN

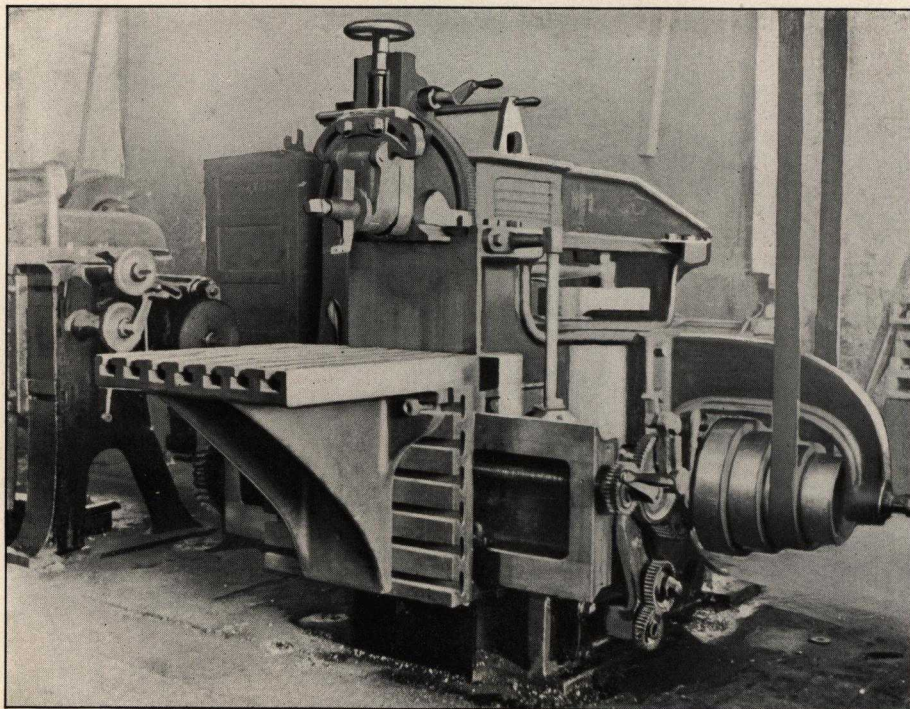
The lathe shown in Fig. 1176 is triple geared and driven by direct-gear multi-voltage motor, the motor shaft taking the place of the usual cone shaft.

This lathe swings $109\frac{1}{2}$ inches over the bed, and 74 inches over the carriages. The central portion of the carriages is removable,

making the swing 93 inches when desired. The carriages have power feeds, including angular feed for compound rest; they also have a rapid power traverse movement by auxiliary motor along the bed in either direction. The carriages are massive and heavy. A controller handle is provided for each carriage, so that the speed of the lathe can be conveniently controlled by the operator without changing his position.



108-INCH BEMENT LATHE ELECTRICALLY DRIVEN



SHAPER OF 1859

SHAPER OF 1859

The accompanying cut is from a photograph sent us by Mr. John S. Cook, of the Georgia Railroad, and shows a Bement and Dougherty 18-inch Shaping Machine shipped to the shops at Augusta, Georgia, in October, 1859.

Mr. Cook writes us that this machine has been in constant use ever since that time, and further that the machine has lately been thoroughly overhauled by them and is now doing as good work as ever.

SAMPLES FROM PRATT & WHITNEY SCREW MILLER

The upper cut on this page shows a right and left groove cut on the same piece intersecting each other. This work is readily done on the Pratt & Whitney Screw Milling Machine. Such pieces are used in the breech mechanism of guns, etc.

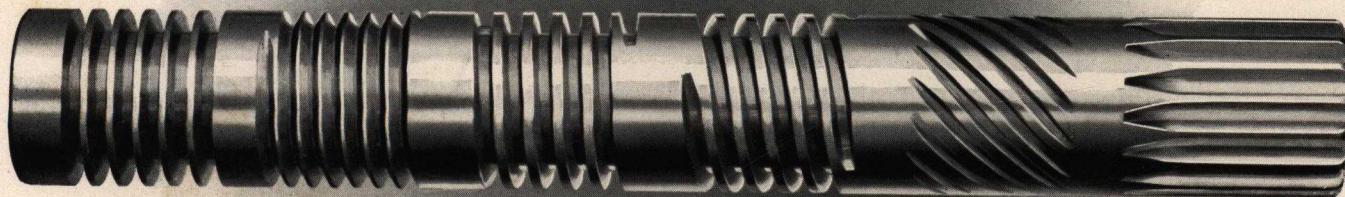
The lower cut is a sample piece of milling. On the right-hand end of the sample is a series of annular grooves or rings; that is, the milling is done at right angles to the axis of the piece.

At the left-hand end of sample, the grooves are parallel to the axis, resulting in a pinion, thus showing the great adaptability of the screw miller.

The rest of the piece contains threads of various pitches down to the spiral pinion form.

These screw or thread milling machines are now in use all over the world, and we are constantly receiving duplicate orders.

It is demonstrated beyond question that machine threads of every kind can be cut better and cheaper in this machine than in a lathe.



SAMPLES FROM PRATT & WHITNEY SCREW MILLER

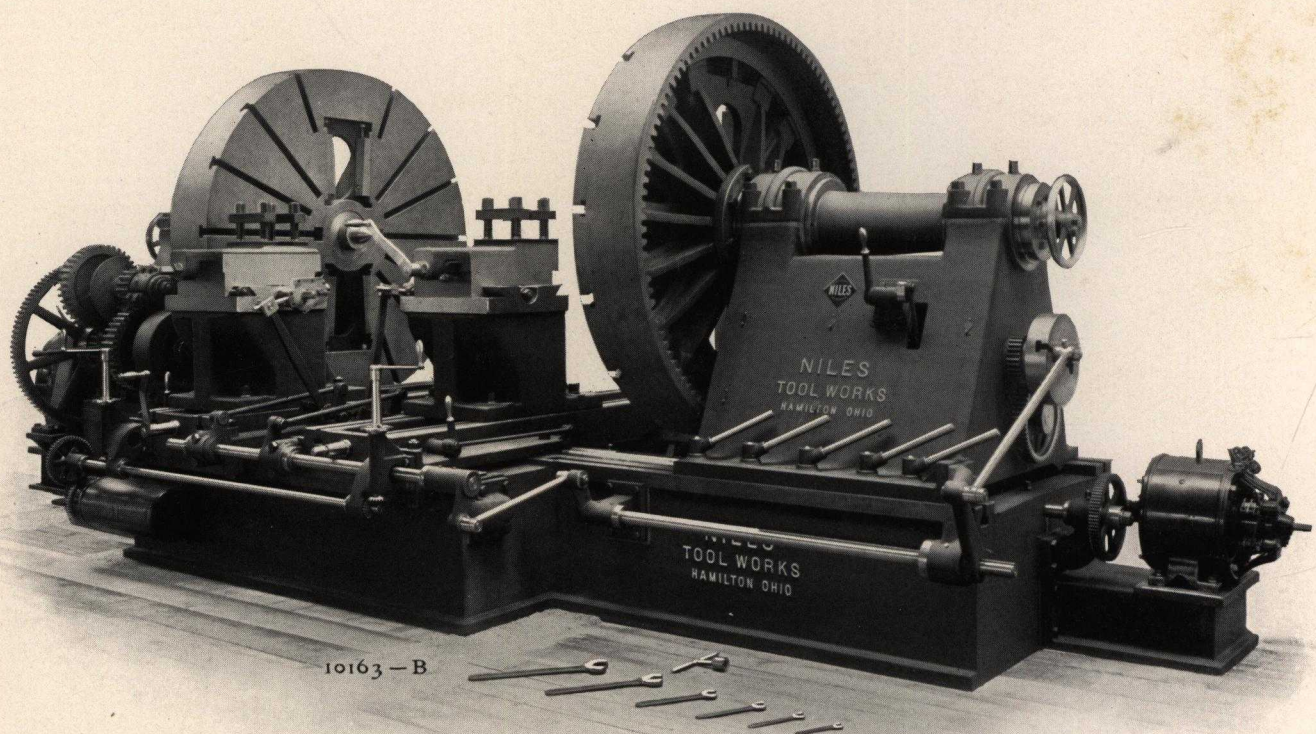
90-INCH DRIVING-WHEEL LATHE

The cut Fig. 10,163 shows our latest design of 90-inch Driving-wheel Lathe.

It has been demonstrated that our lathes specially designed for turning steel-tired car wheels are capable of taking off more metal than almost any other machine in railroad service; that is, a greater weight of chips per unit of time.

There seems to be no reason, in the nature of the case, why as much weight of chips

been devised to hold the wheels solid with the face-plate and prevent their yielding to the strain incident to the cut; also to prevent the deflection of the axle. The difficulty we have met in this case is one which is often met with in machine tools at the present time. By a process of evolution, the metal-working machinery has been getting heavier and more powerful from year to year, until at the present time in some instances the capacity of the machine is out of proportion to the stiffness of



90-INCH DRIVING WHEEL LATHE

should not be taken off on a 90-inch wheel as on a 42-inch wheel, provided the machines were equally efficient. A comparison of the driving-wheel lathes in use with machines used for turning steel-tired car wheels, shows that the design of the large machines are proportionately heavy and powerful. The trouble is that the strength and stiffness of the work put in large machines is inferior to the machine itself. In the machine illustrated, methods have

the work itself, and it becomes largely a question of so steadying the work that the power in the machine can be effectively applied.

The motor shown in the illustration is used only for traversing the head and carriages. The motor for the main drive is hidden from view by the farther face plate. It is of the variable-speed type, but there is also one change of speed by gearing, giving a wide range of speeds to the face plates.

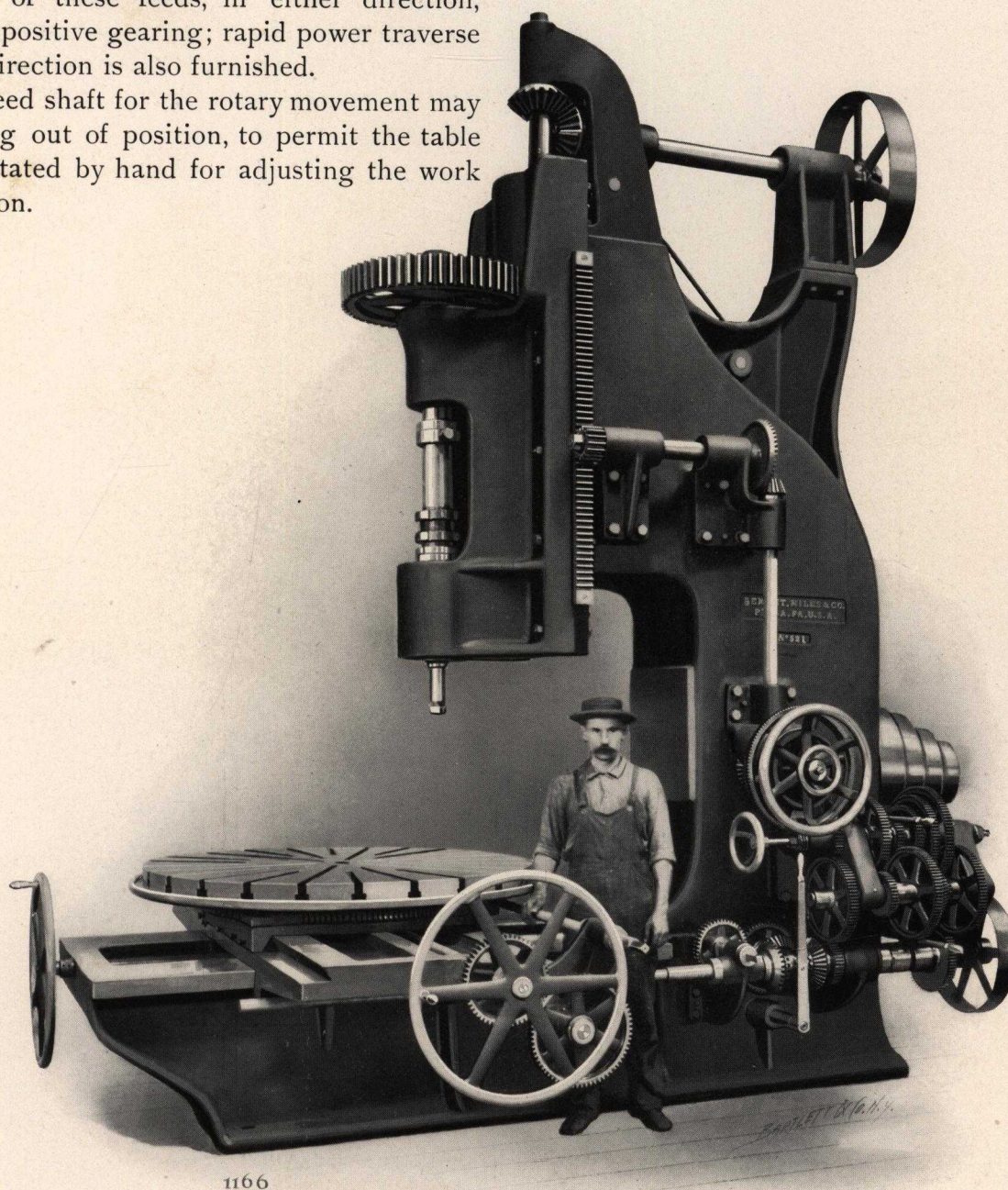
VERTICAL MILLING MACHINE

The milling machine shown in Fig. 1166 is now regularly built at our Bement-Miles Works. It is equipped with a table 60 inches in diameter on its working surface, having a dish around it for catching the lubricant used in cutting; the tank and pump for this lubricant can be supplied when desired. The table has 48 inches longitudinal, 60 inches cross traverse, and circular movement, there being six changes of each of these feeds, in either direction, through positive gearing; rapid power traverse in any direction is also furnished.

The feed shaft for the rotary movement may be swung out of position, to permit the table to be rotated by hand for adjusting the work in position.

The spindle is 5 inches in diameter and counterweighted, the counterweight being inside the frame. It has 44 inches traverse and four changes of speed and when so ordered may be furnished with six changes of positive power feed.

The size of this machine can be appreciated in comparison with the figure standing alongside.



NO. 11 VERTICAL MILLING MACHINE

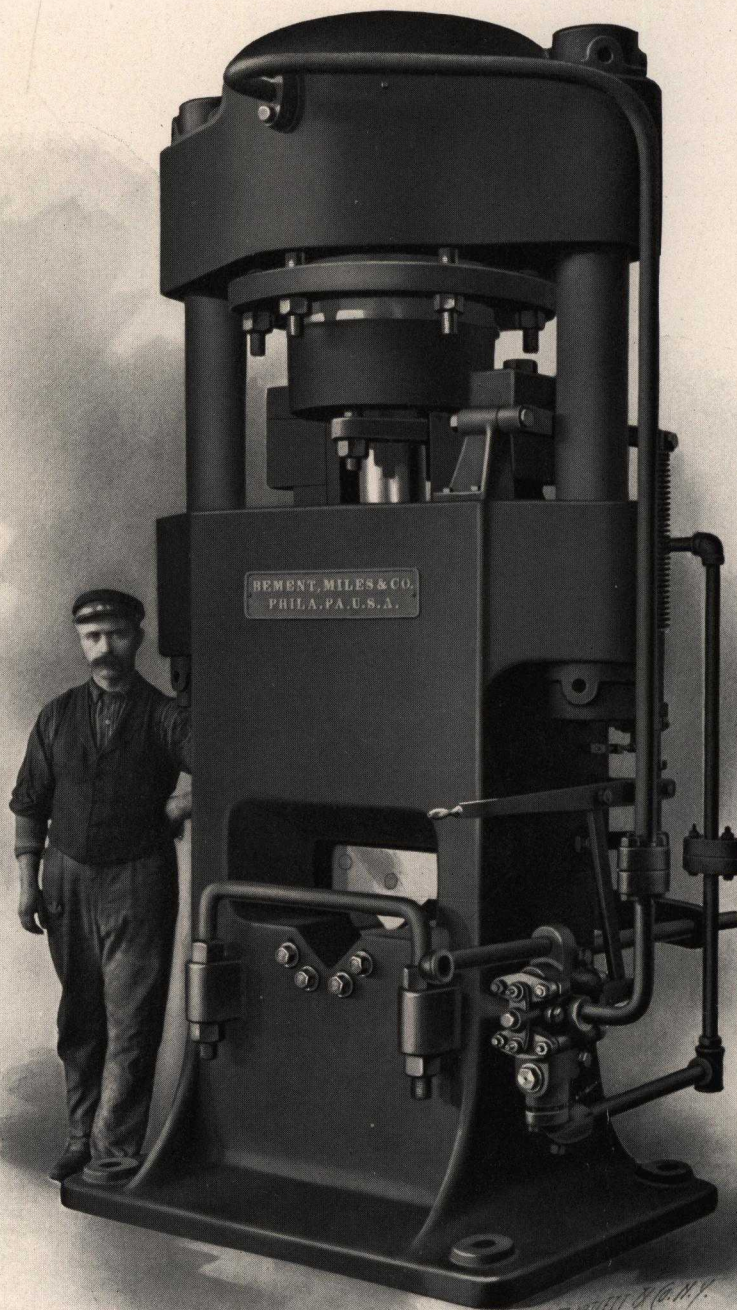
HYDRAULIC ANGLE AND BAR SHEAR

Fig. 1328 shows a Hydraulic Angle and Bar Shear of larger capacity than the one described in the last issue of this paper. It is practically built on the same lines, and has a capacity of 250 tons at 1500 pounds water pres-

sure per square inch, which is sufficient for shearing 5 x 5 x $\frac{1}{8}$ -inch angles and, 12 x $1\frac{1}{4}$ -inch flat bars.

This style of shear is built in various sizes and capacities.

The shear is shown equipped with knives for cutting angles, but knives for cutting bars or other shapes may be substituted for these.



1328

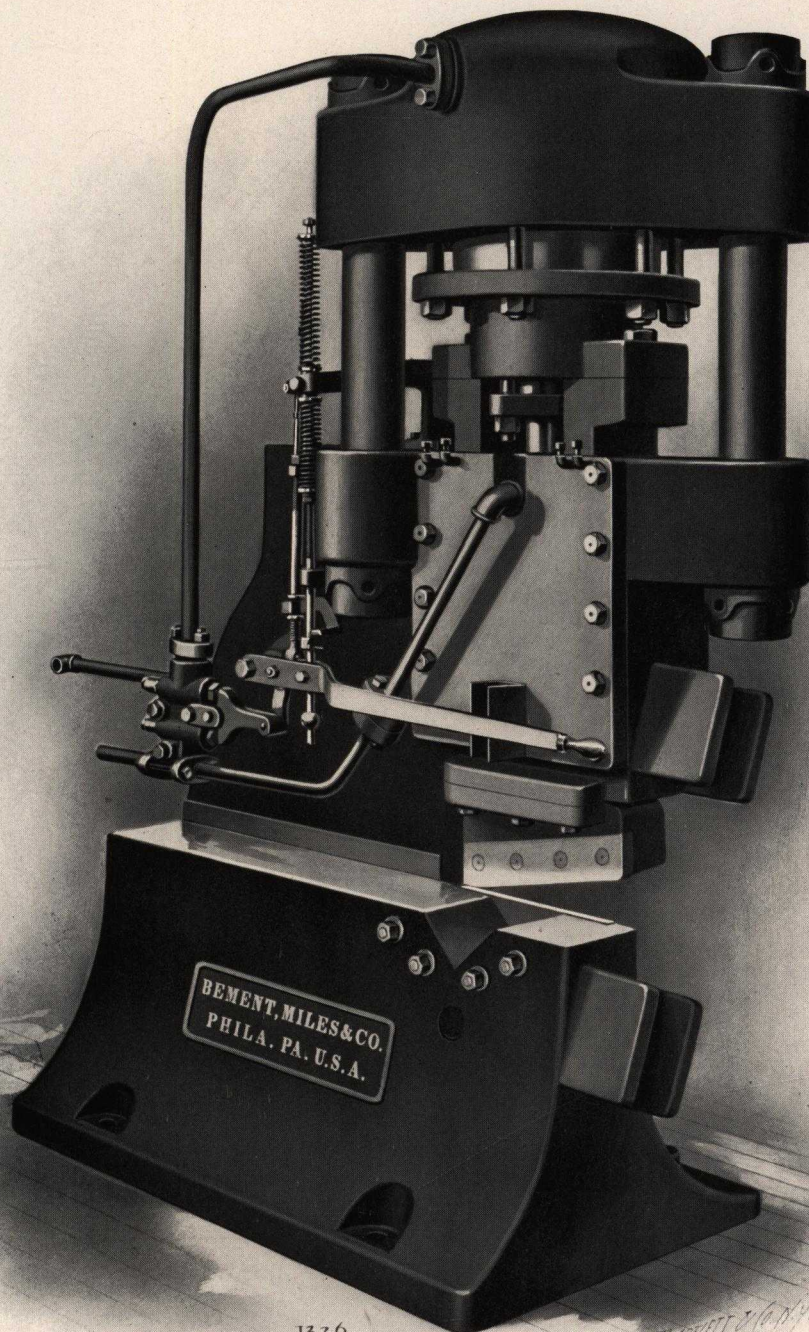
HYDRAULIC ANGLE AND BAR SHEAR

UNIVERSAL HYDRAULIC SPLITTING SHEAR

In Fig. 1326 is shown the latest Hydraulic Splitting Shear made by the Bement-Miles Company. It has 124 tons pressure, giving a capacity to shear plates $\frac{3}{4}$ inch thick, and of any width, or 5 x 5 x $\frac{1}{2}$ -inch angles when the tension bolt is in place on the frame. This machine can be run automatically, or by slight

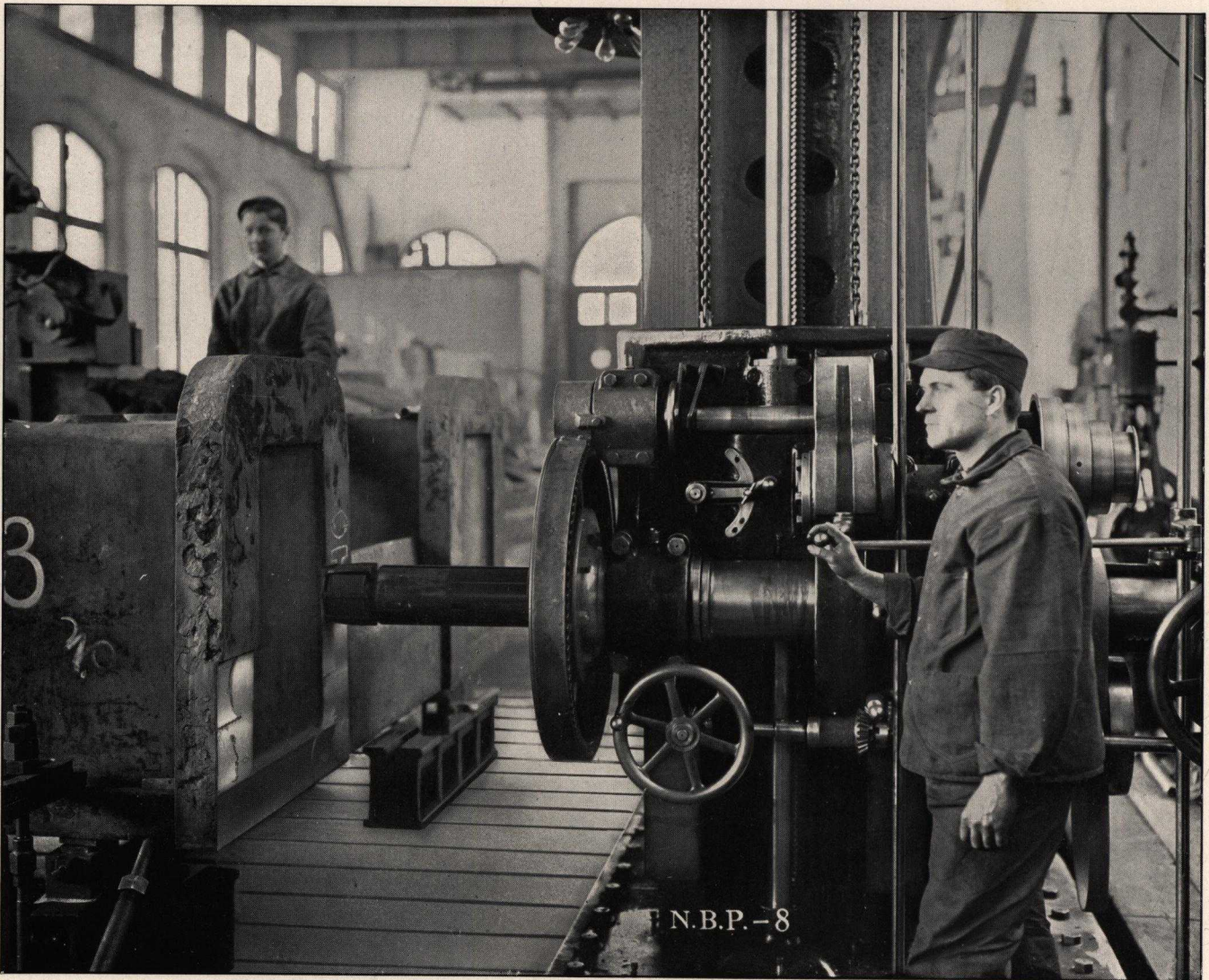
adjustment arranged so that the head descends, shears plate or angle, and returns to top of stroke and remains at rest.

The advantages of hydraulic punching and shearing machinery are that they consume power only when they are in use, that they are noiseless in action and have few wearing parts, and that the shearing load is always a definite amount, so that there is no danger of straining the machines.



1326

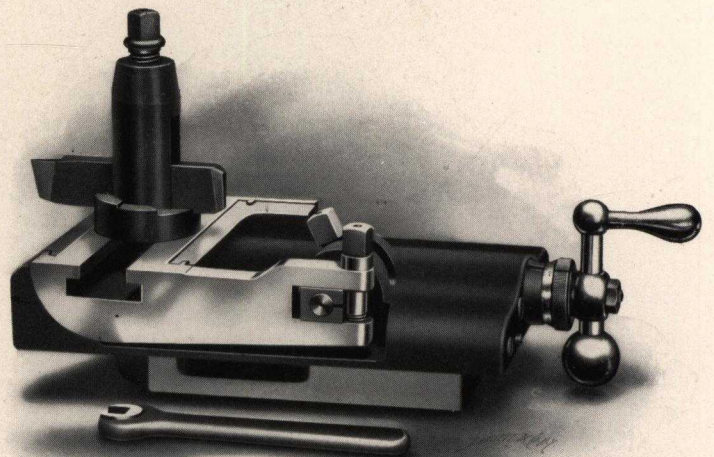
UNIVERSAL HYDRAULIC SPLITTING SHEAR



HORIZONTAL BORING, DRILLING AND MILLING MACHINE DOING A MILLING JOB

FLOOR BORER AT WORK

The cut shows a moderate-sized Horizontal Boring, Drilling and Milling Machine finishing the base of a casting too large to go through the planer. There is a variety of work on which this method is much more economical and convenient than the planer, the work being simply leveled on a floor plate in front of the machine, and an end mill used to finish the necessary surfaces. Faster and better work is done by the milling cutter in cases of this kind, the loss of time by return stroke being saved, and also the idle running of the planer tool across open spaces. The milling cutter keeps constantly at it, the feeds in various directions enabling the cutter to follow the work.



COMBINED ELEVATING AND COMPOUND REST BEING BROUGHT OUT BY PRATT & WHITNEY CO.

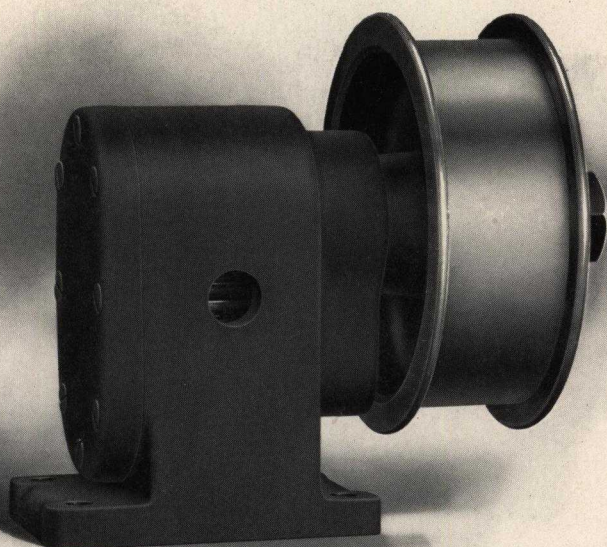
T H E P R O G R E S S R E P O R T E R

RAPID DRILLING

Performed on an old 6-foot Pond Radial Drill in 22 minutes, including time consumed in changing drills, speeds and feeds, all drilled in cast-iron 1 inch thick.

Diameter of Drill Inches	Time to Drill One Inch	Diameter of Drill Inches	Time to Drill One Inch
$\frac{1}{2}$	7 seconds	2	55 seconds
$\frac{5}{8}$	7 seconds	$2\frac{1}{4}$	1 minute 38 seconds
$\frac{3}{4}$	7 seconds	$2\frac{1}{2}$	1 minute 45 seconds
$\frac{7}{8}$	7 seconds	$2\frac{3}{4}$	1 minute 50 seconds
1	7 seconds	3	2 minutes 00 seconds
$1\frac{1}{4}$	15 seconds	$3\frac{1}{4}$	2 minutes 00 seconds
$1\frac{1}{2}$	15 seconds	$3\frac{1}{2}$	2 minutes 07 seconds
$1\frac{3}{4}$	22 seconds		

Time consumed in drilling	13 minutes 42 seconds
Time consumed in changing	8 minutes 18 seconds
Total	22 minutes 00 seconds



2878

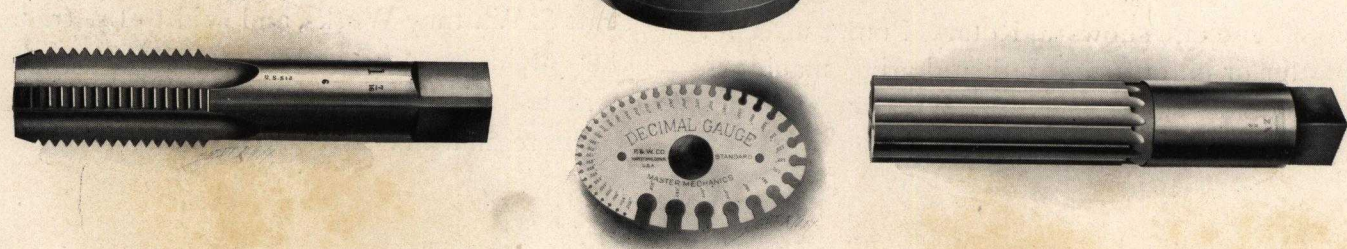
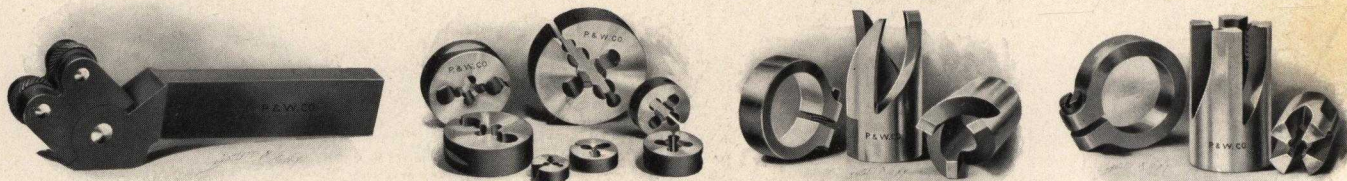
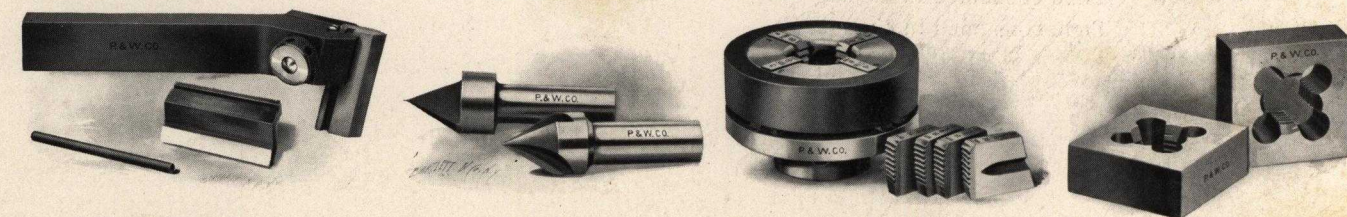
ROTARY OIL OR SODA WATER PUMP

ROTARY PUMP

The cut shows a Rotary Pump, used for water or oil on turret lathes, boring machines, automatic screw machines, and tools of this general character. These pumps are now

being manufactured by the hundred at the Pratt & Whitney Works, and sold to the trade. Our facilities are such that they can be marketed at a price which cannot be reached by the regular machine shops.

THE PROGRESS REPORTER



PROGRESS REPORTER



NILES - BEMENT-POND CO.
136-138 LIBERTY ST., NEW YORK.

JULY, 1904

No. 3

LOUISIANA PURCHASE EXPOSITION SPECIAL NUMBER



PALACE OF MACHINERY

P R O G R E S S R E P O R T E R

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NILES-BEMENT-POND COMPANY, NEW YORK
LONDON, 23-25 VICTORIA ST., S. W.

JULY, 1904

No. 3

THE PROGRESS REPORTER will be issued by the Niles-Bement-Pond Company every few weeks as interesting new matter accumulates.

The object of the publication is to keep the employés of the company, and the public generally, informed as to the new machines and devices which are constantly being brought out.

Any of our customers, or their employés, or our friends generally, who may desire to receive copies regularly can do so by writing to that effect to our New York office.

WE shall be glad to publish in these columns short articles from those using our machinery, referring to any results they may have obtained, which from their nature or novelty will be of general interest. Such articles should not exceed 350 words in length.

NILES-BEMENT-POND COMPANY
and PRATT & WHITNEY COMPANY
Exhibits at the LOUISIANA PURCHASE EXPOSITION

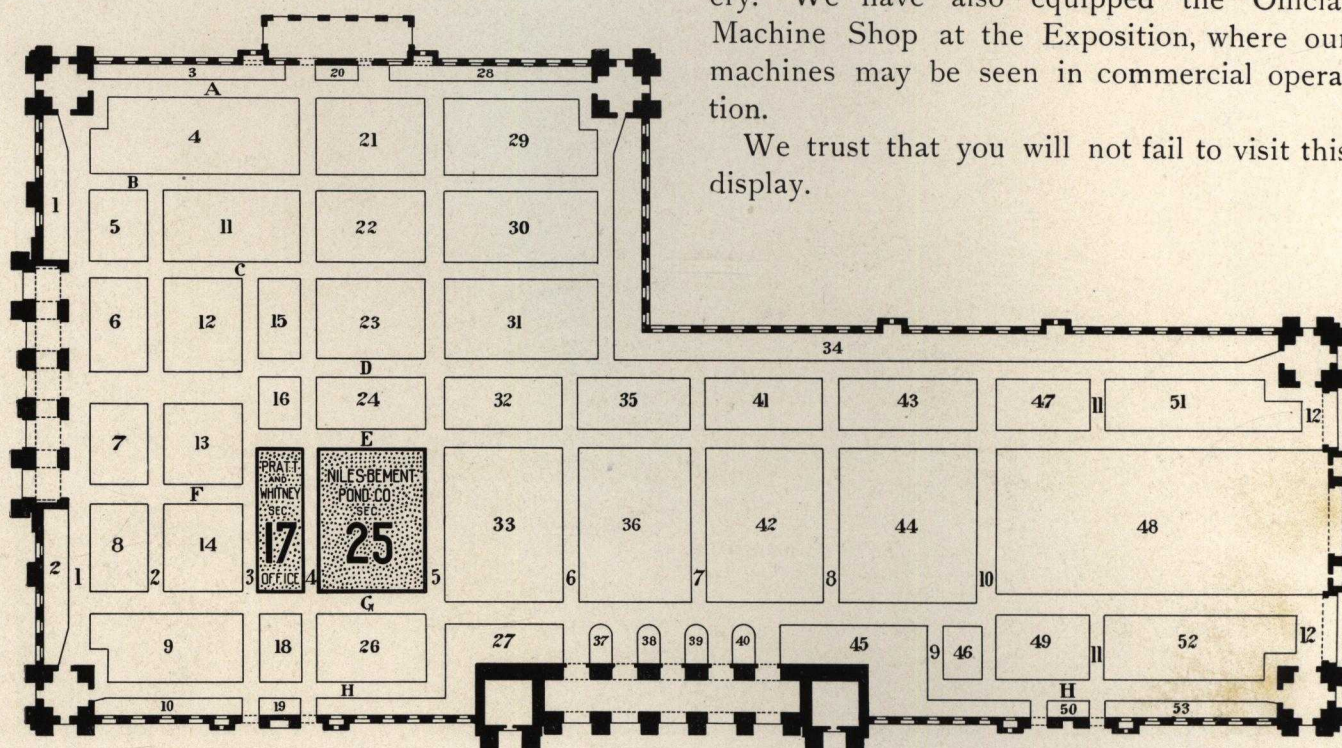
ACORDIAL invitation is extended to all those interested in machine tools to visit our exhibit, sections 17 and 25, Palace of Machinery, World's Fair, St. Louis. All machines exhibited are either of entirely new designs or embody radical modifications of older patterns and are well worth the careful study of all machine tool users.

All the larger machines are driven by direct-connected motors. The more important machines are illustrated on the following pages.

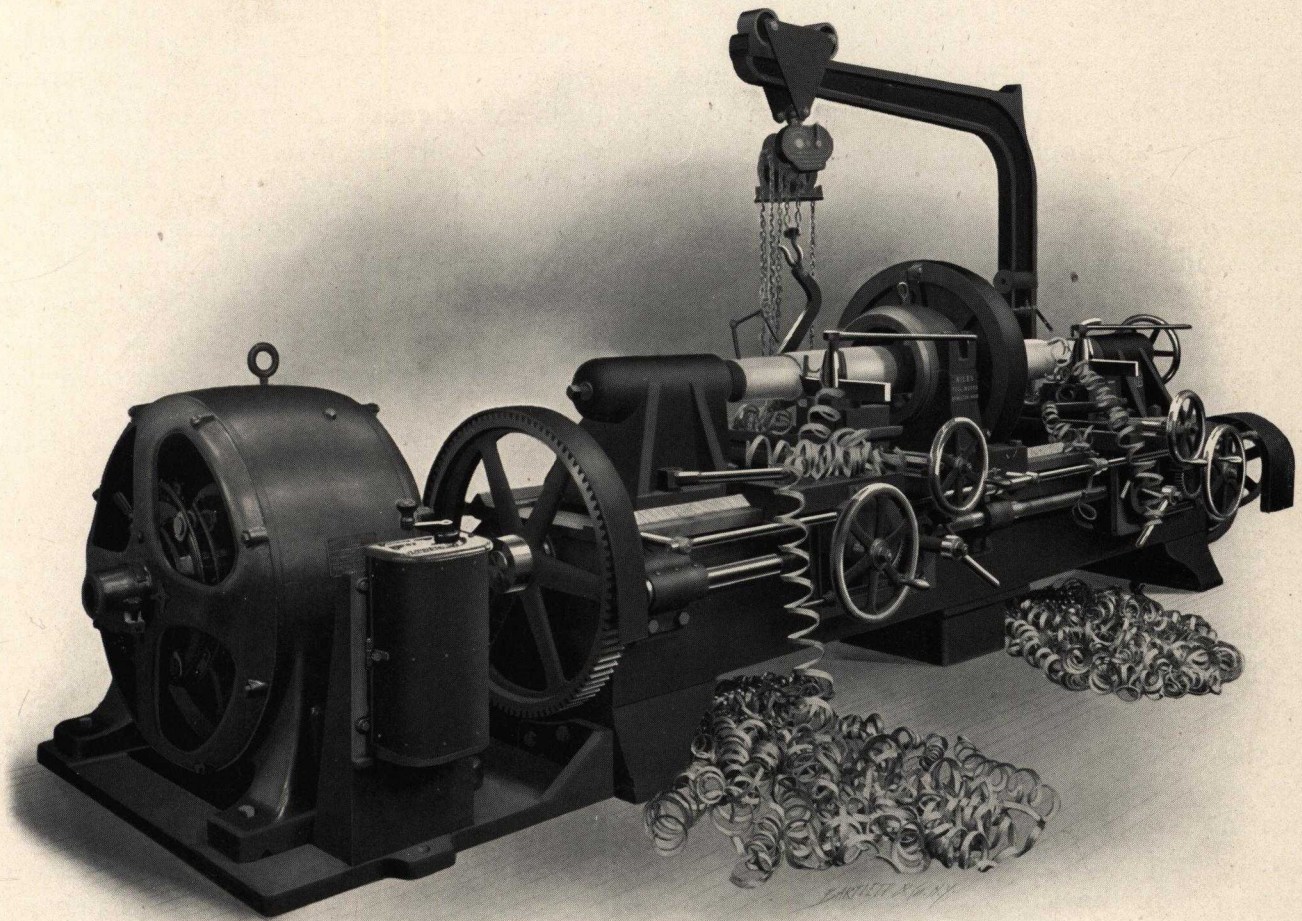
The Pratt & Whitney Company exhibit a large number of entirely new machines, all of which are extremely interesting. We believe this to be the best exhibit of machine tools ever made at any exposition.

In addition to the general exhibit in Machinery Hall, there are a number of our machines shown in the Electrical Building in the exhibits of various manufacturers of electrical machinery. We have also equipped the Official Machine Shop at the Exposition, where our machines may be seen in commercial operation.

We trust that you will not fail to visit this display.



PLAN OF THE PALACE OF MACHINERY, WORLD'S FAIR, ST. LOUIS



167

No. 3 NILES DOUBLE AXLE LATHE

No. 3 NILES HEAVY DOUBLE AXLE LATHE

The double axle lathe is essentially a Niles tool, having been originated and developed by that company more than thirty years ago. Hundreds of Niles Double Axle Lathes are in use throughout the world and on their lighter pattern lathe the record of 20 axles per day was established. That lathe is still in demand and is doing record work in finish-turning axles.

To meet the increased size of axles and for both roughing and finishing axles with modern tool steel we have brought out this 12-inch extra powerful machine. It is a simple, pow-

erful lathe, requiring for its maximum duty 40 horse-power and is essentially a manufacturing machine.

We invite comparison with any lathe built for quantity of work turned out every day in the year.

Dimensions of the No. 3 Axle Lathe are as follows: Diameter of hole in center head, 12½ inches. Maximum distance between centers, 8 feet. The axle is driven at its center by a double equalizing driver. Carriages are provided with automatic feed release by collars on the rod at the front and have rapid hand traverse. Feeds are driven by gearing. A crane is provided for the convenient handling of axles.

80-INCH NILES EXTRA-HEAVY DRIVING-WHEEL LATHE

The design of this machine is entirely new and embodies many improvements in construction and in operation. It has been specially designed for taking the heaviest cuts with modern tool steels. The face-plates are 80 inches in diameter and each is driven by a steel pinion engaging in an internal gear on the face-plate, leaving the outside of the face-plate smooth. This method of construction avoids the use of a long driving shaft, which by its torsion is apt to cause chattering. The shaft in this lathe has about four-fold more strength to resist torsion than the long driving shaft of the ordinary wheel lathe.

Cutting speeds ranging from 10 to 32 feet per minute are provided.

On account of the necessity for holding the wheels sufficiently rigid to use the full power of this machine at the cutting tools, special devices have been adopted. The wheels are put into the machine on centers, each headstock being provided with a sliding spindle. Openings in the face-plates are provided for the crank pins, which permit the face-plates to be brought very close to the wheels. In addition to the drivers attached to the face-plates and engaging on the arms of the wheels, provision is also made to utilize the crank pins to assist in driving the wheels. For this purpose wedge-shaped steel slides are inserted in the openings of the face-plate and by means of screws projecting to the rim of the face-plates they can be adjusted with great nicety to bear against the crank pins. In order to provide means for quickly changing the distance between face-plates one headstock is furnished with a $3\frac{1}{2}$ -horse-power motor for traversing. The carriages are provided with rapid power traverse in either direction by means of opening nuts on the traversing screw, which is driven by the $3\frac{1}{2}$ -horse-power motor.

The feeds are operated by an adjustable crank plate driven by gearing on the right-hand headstock, from which the motion is conveyed by a rocker shaft placed on the front

of the bed and connected by suitable ratchets to the feed screws.

All the details of this machine are extremely heavy and designed to withstand the strain of the heaviest cuts. Bronze bearings are provided for all the driving shafts. All small pinions are of forged steel. The face-plate spindles are very long and both front and rear bearings are fitted with heavy bronze bushings made in halves. This is the most powerful driving-wheel lathe ever built. The main driving motor is of 50 horse-power capacity.

LATHE FOR TURNING STEEL- TIRE CAR WHEELS

The well-known Pond Steel-tired Car-wheel Lathe, hundreds of which are in daily use both in this and foreign countries, is illustrated on page 6. There is no machine equal to it for turning the steel tires of car wheels.

The machine we are exhibiting at St. Louis is driven by a 15-horse-power motor geared directly to the machine. A general description of the lathe is as follows:

Designed for turning or truing up two car wheels of 42 inches or smaller diameter at same time, without removing from the axle.

Self-centering chucks to grasp the axle journals, and chuck jaws to engage the tires, are provided, in order that the power of the machine may be fully utilized. The use of these chucks and chuck jaws, in connection with the patented driving dogs attached to the centrally-driven plates, prevents any springing of the axle or crowding the wheels out of true sideways.

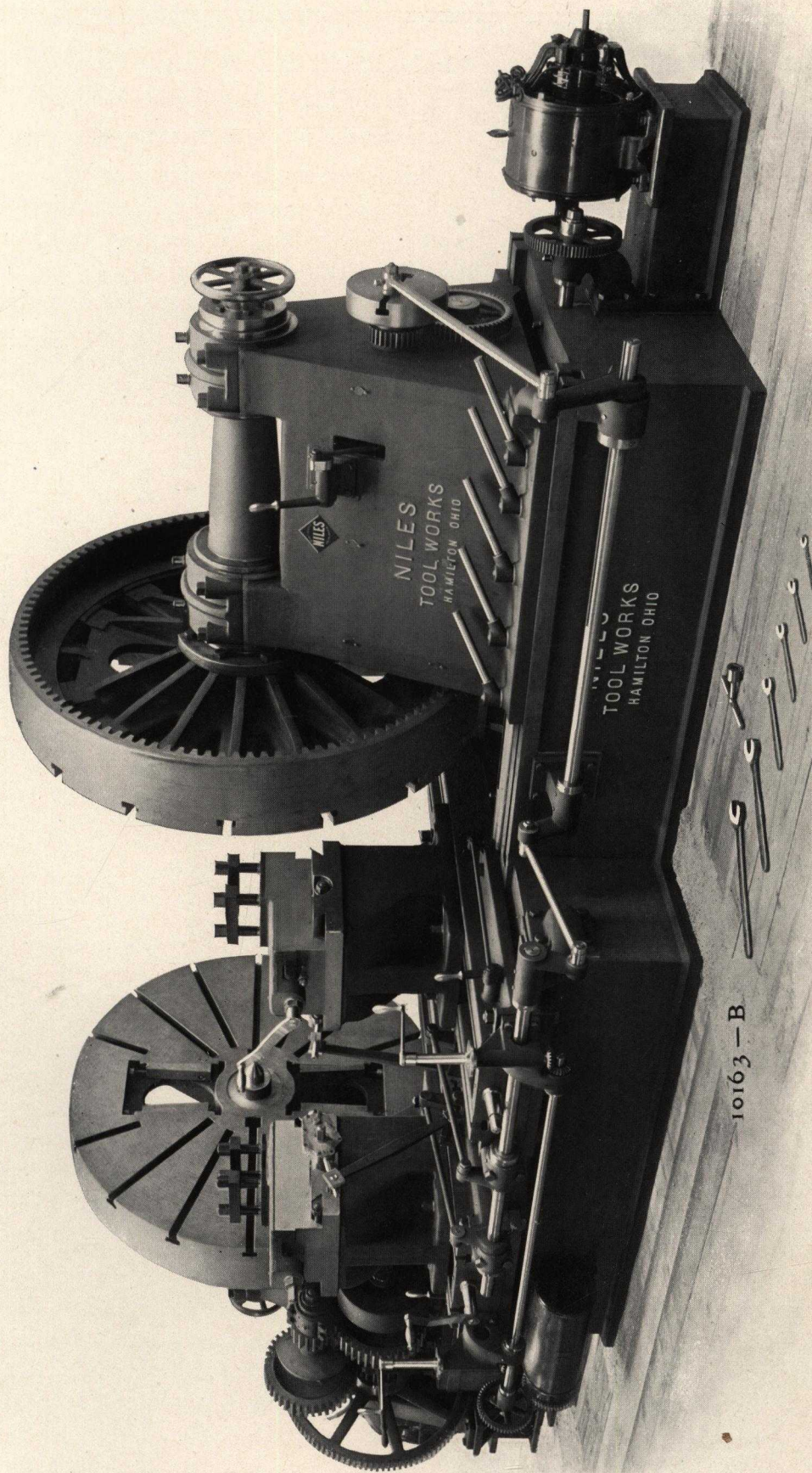
The following table is a report of work accomplished on this machine in several shops:

Allen Wheels	Put in Lathe	Completed	Time Consumed
One pair 38-inch	5.00 p.m.	7.00 a.m.	1 hour 30 minutes
One pair 38-inch	7.00 a.m.	8.20 a.m.	1 hour 20 minutes
One pair 38-inch	8.20 a.m.	9.30 a.m.	1 hour 10 minutes
One pair 38-inch	9.30 a.m.	11.25 a.m.	1 hour 55 minutes
One pair 38-inch	11.25 a.m.	1.42 p.m.	1 hour 32 minutes
One pair 38-inch	1.42 p.m.	3.18 p.m.	1 hour 36 minutes
One pair 38-inch	3.18 p.m.	4.50 p.m.	1 hour 32 minutes

Seven pairs, 10 hours 35 minutes.

Average time consumed per pair in turning, 1 hour 30 minutes.

The last four pairs turned were harder than the average wheel.



10163-B

80-INCH NILES EXTRA HEAVY DRIVING WHEEL LATHE

28-INCH POND NEW MODEL MOTOR-DRIVEN LATHE

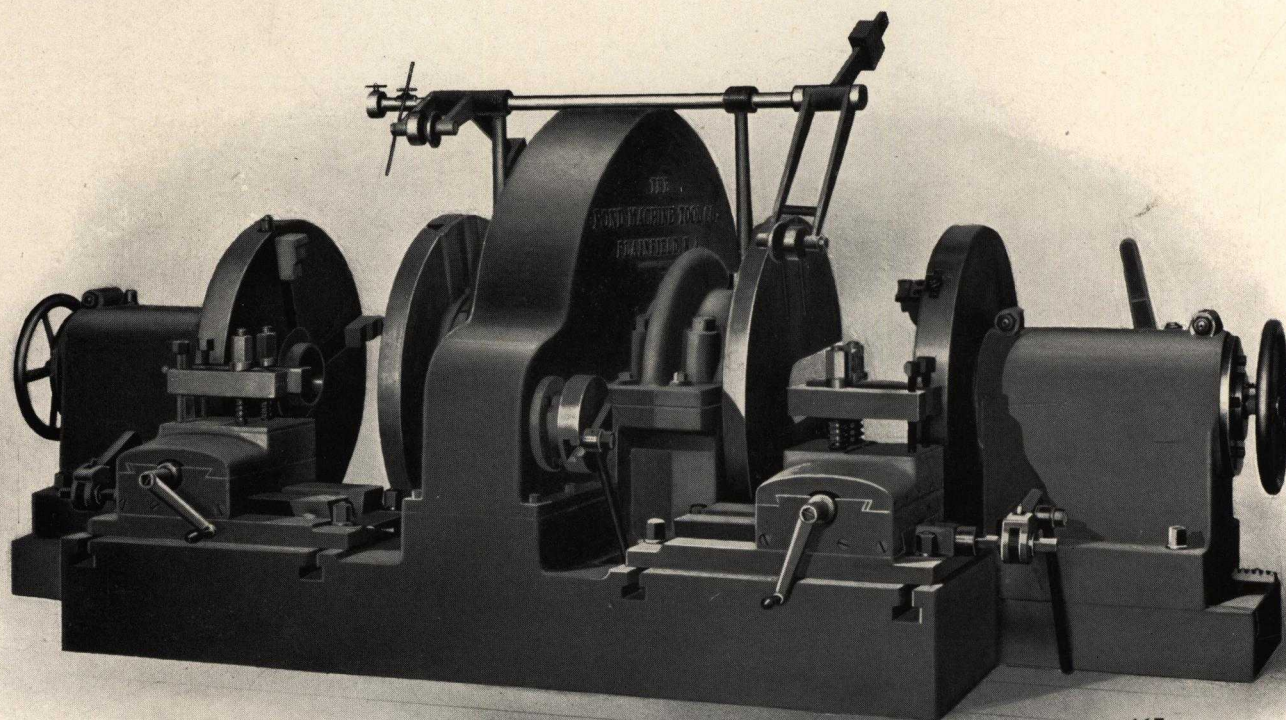
This lathe has a geared head with friction speed changes and is arranged so that it may be started, stopped, reversed or any of its 60 speed changes obtained by means of handles on the carriage. The operator therefore does not have to leave his position at the carriage and can change the speed of the lathe with the

30-INCH POND RAPID REDUCTION LATHE—MOTOR DRIVEN

AN ENTIRELY NEW DESIGN FOR HEAVY ROUGHING

This is a very heavy machine and is driven by a 25-horse-power one-voltage variable-speed motor, giving through gearing 30 changes of spindle speed. Speeds as high as 200 feet per minute on a 2-inch diameter are provided.

By means of a handle on the carriage the



415

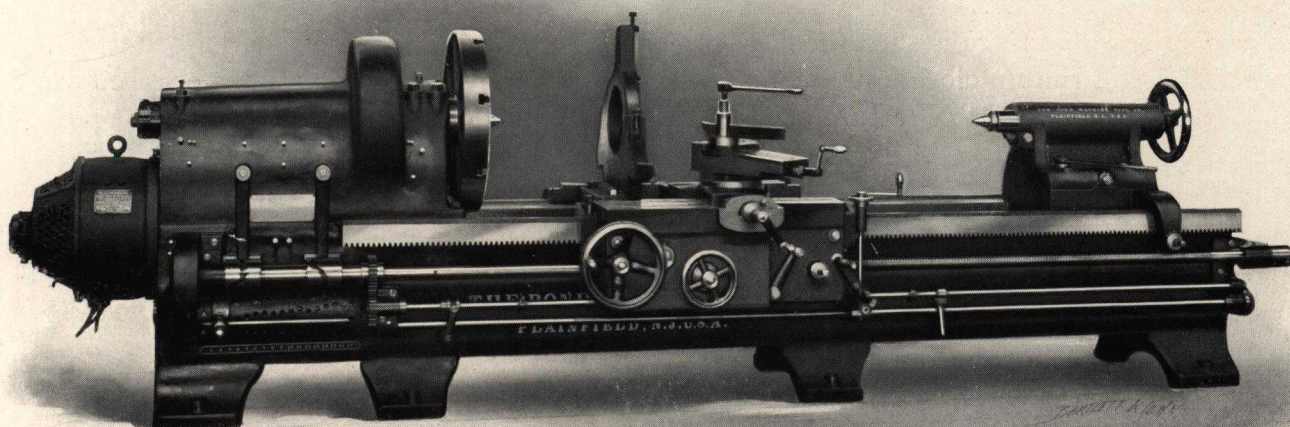
POND STEEL-TIRED CAR WHEEL LATHE

greatest facility. The construction is such that only one speed can be engaged at a time. Screw-cutting attachment and feeds are driven through a patented change-gear device giving 32 feeds from 4 to 64 or 32 threads from 1 to 16 per inch without the removal of a single gear.

All the rotating shafts in the headstock have ring self-oiling bearings lined with bronze.

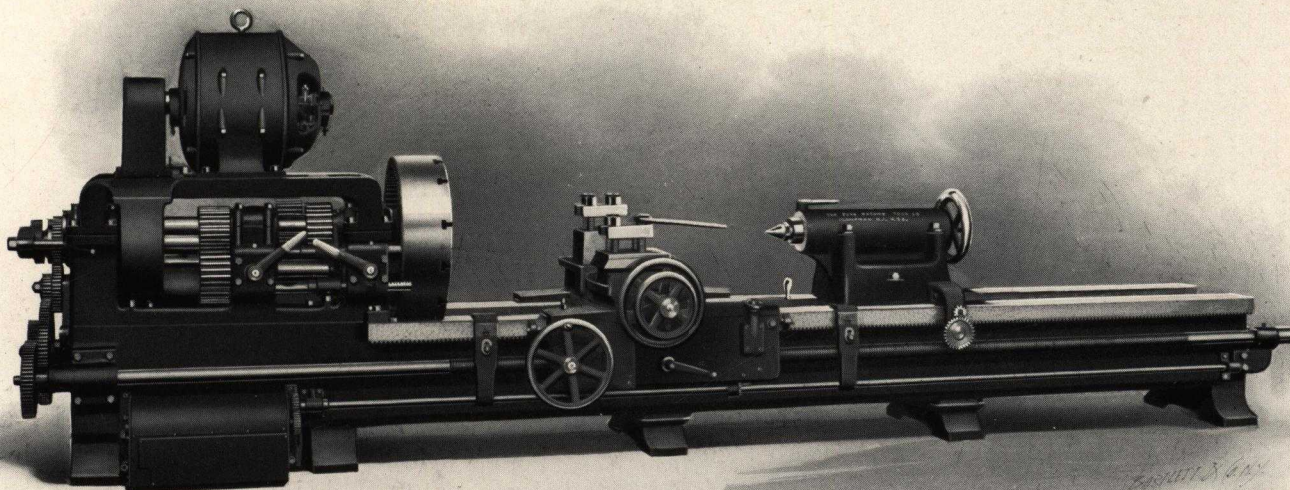
Swing over carriage, 22 inches. With 10-foot 6-inch bed turns 4 feet between centers.

lathe may be started, stopped, reversed or any of the different motor speeds obtained without requiring the operator to leave his position at the carriage. The carriage has front and back tool slides of very rigid design which may be adjusted separately or together. The front tool-slide has independent lateral adjustment. All revolving shafts in the headstock are mounted in ring self-oiling bearings lined with bronze. Swing over carriage, 16 inches. Turns between centers with 12-foot 6-inch bed, 4 feet.



1285

28-INCH POND NEW MODEL MOTOR-DRIVEN LATHE



1286

30-INCH POND RAPID-REDUCTION LATHE

POND "RIGID" TURRET LATHE

This machine is designed for handling castings up to 28 inches in diameter. Swing over carriage ways, 26 inches; over cross-slide, 24½ inches. Travel of turret, 5 feet. Lathe is equipped with a 24-inch 3 or 4-jawed independent or combination chuck.

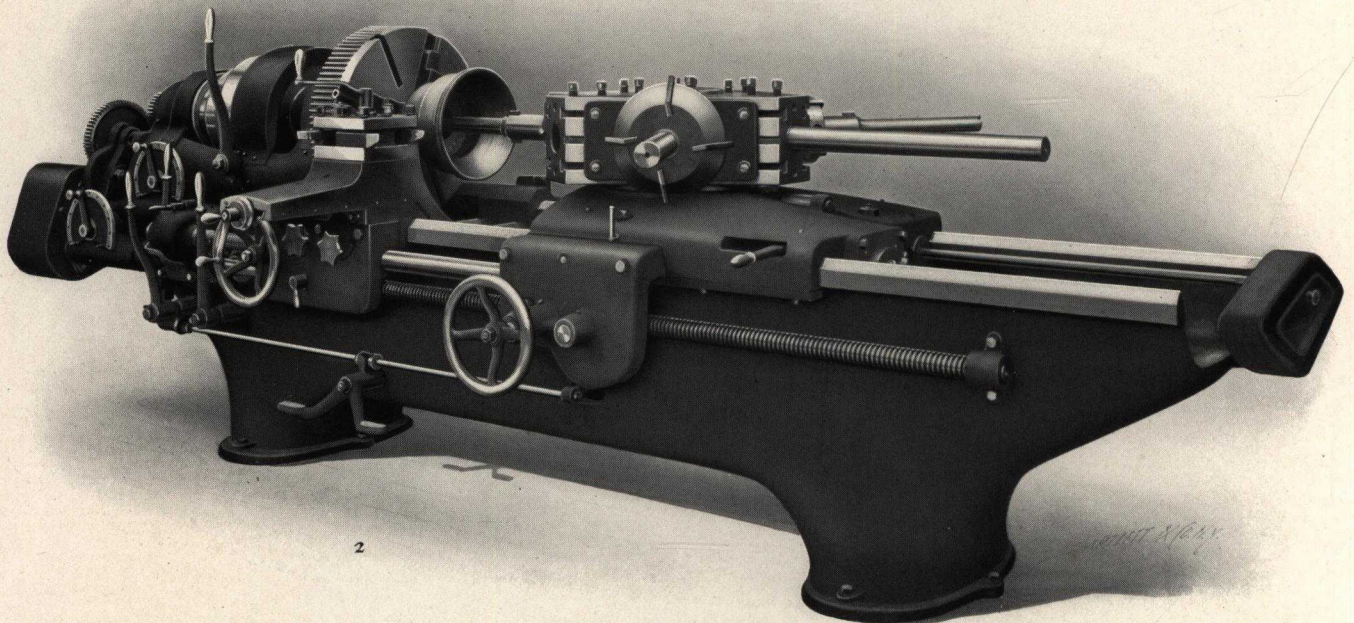
The design of the carriage is such the faces of the turret can be run up close to the chuck. This is a particularly desirable feature in that it reduces the overhang of the boring bars and facing heads. Six changes of independent feed are provided for both the carriage and the turret, each having a separate lead screw so that work can be turned while boring is being done.

with both roughing and finishing cutters to be used, the roughing cutter being inside the spindle while the finishing cutter is at work.

The compact design and great weight of this machine make it amply stiff under the heaviest cuts.

42-INCH POND LATHE

This lathe is our new Pond Geared-head Lathe and is driven by a 6½-horse-power motor, which is of the direct-current variable-speed type. The controller is operated by a handle which is attached to the carriage, making a very convenient method of changing the speed. The lathe has 20 turning speeds.



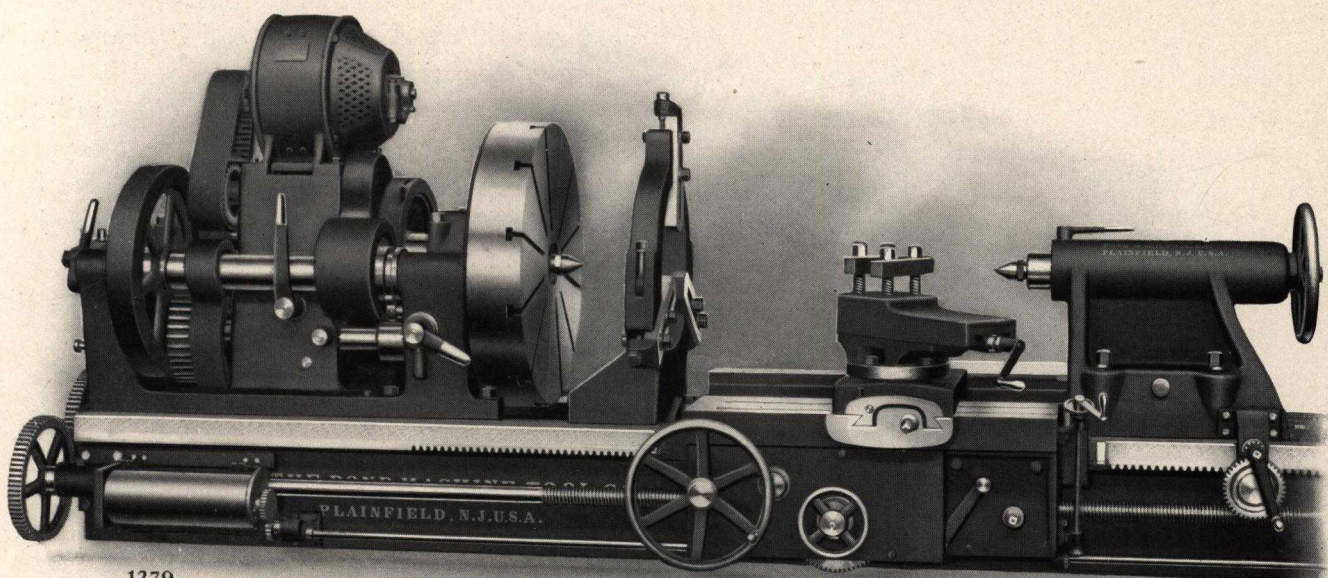
POND "RIGID" TURRET LATHE

The design of the turret permits of very wide faces, so that the heaviest tools can be rigidly secured. It rotates automatically and has rapid power traverse in either direction. Independent stops are provided for each face and it may be made to revolve at any desired point of its travel.

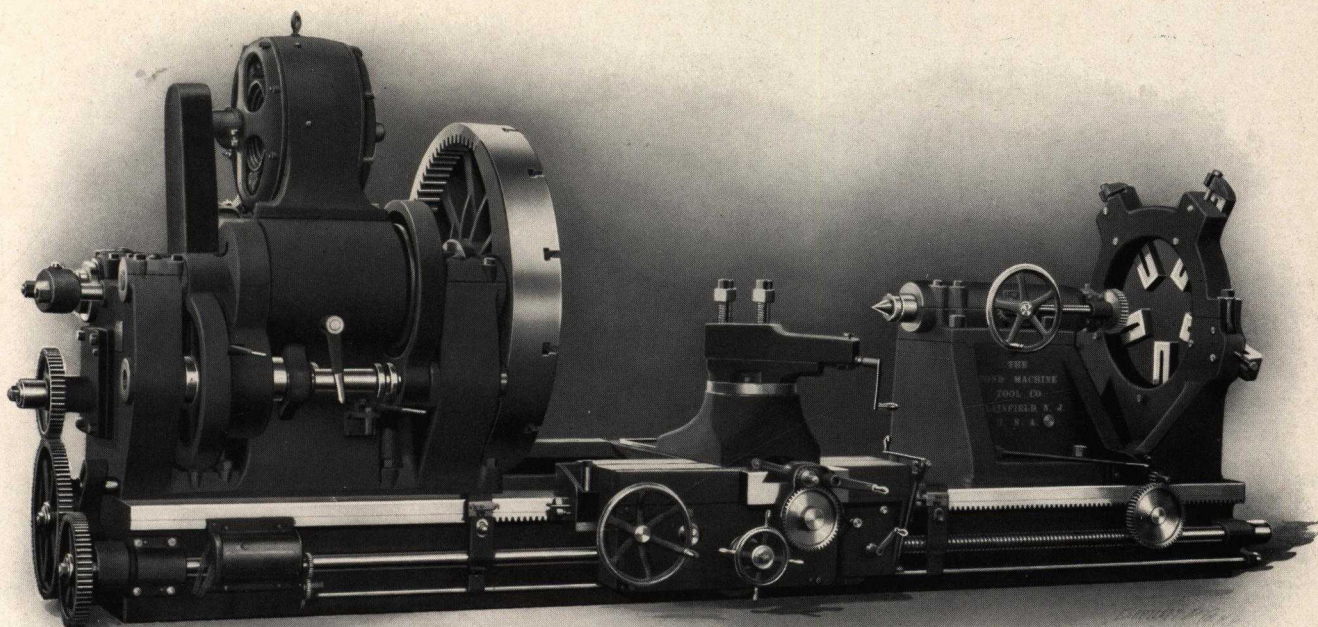
The spindle has a 4⅛-inch hole through it, and is counterbored to 5⅛ inches in diameter, 12 inches in depth, so as to permit boring bars

72-INCH POND LATHE

The new 72-inch Pond Geared-head Lathe shown on the opposite page is driven by a 15-horse-power motor of direct-current variable-speed type controlled by a handle on the carriage. Forty turning speeds are provided. Swing, 73 inches over bed and 62 inches over carriage. With 21-foot bed turns 9 feet between centers.



42-INCH POND LATHE



72-INCH POND LATHE

42-INCH POND FORGE PLANER

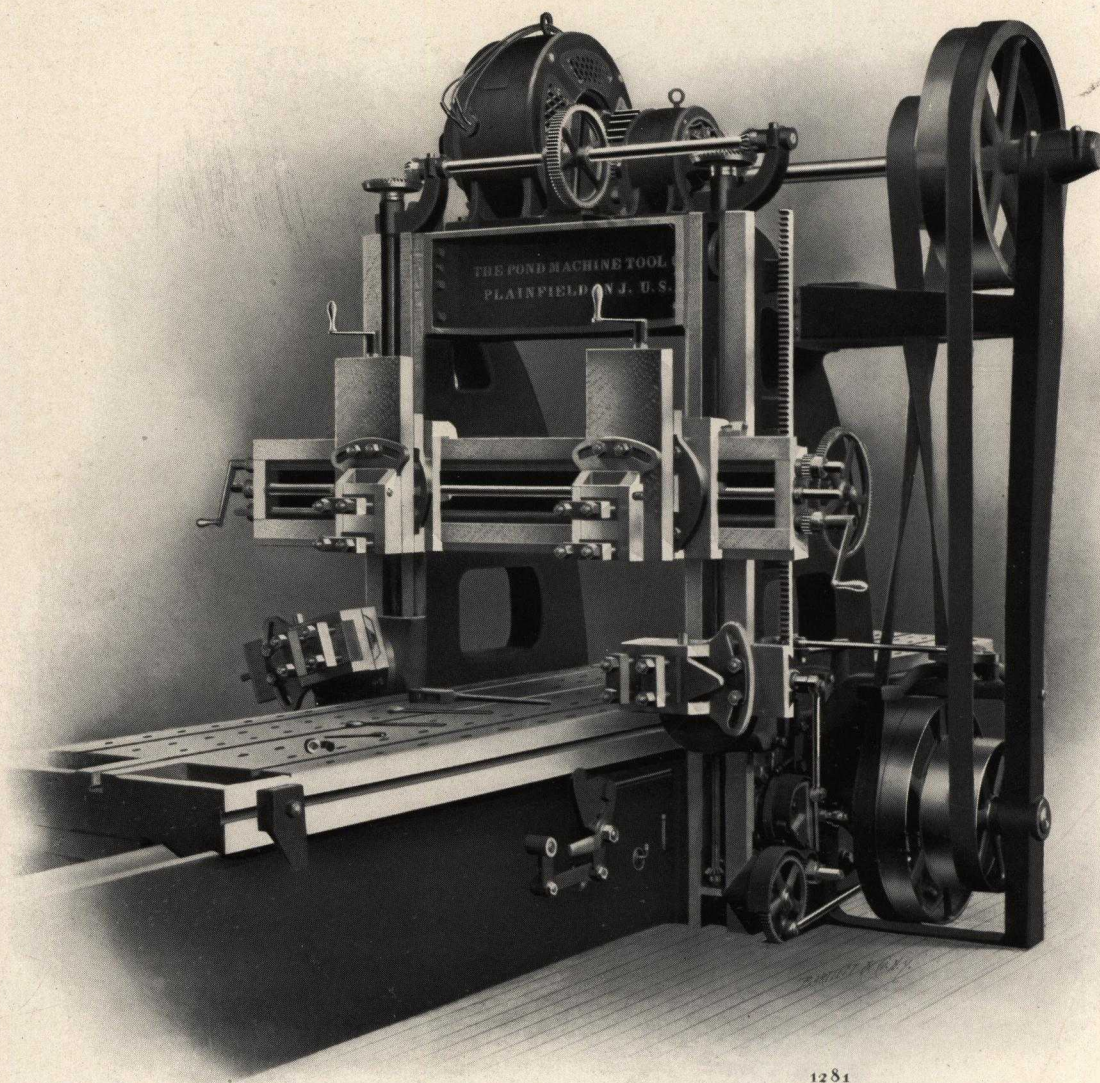
In the 42-inch planer illustrated below there are no overhung shafts or pulleys, a substantial outboard support being provided for the driving shafts. The motor is placed on the arch at the top of the housings.

An auxiliary motor is provided for raising and lowering the cross-rail. The bed is very

heavy and is strengthened where the gearing and uprights are mounted, and is nearly twice the length of the table.

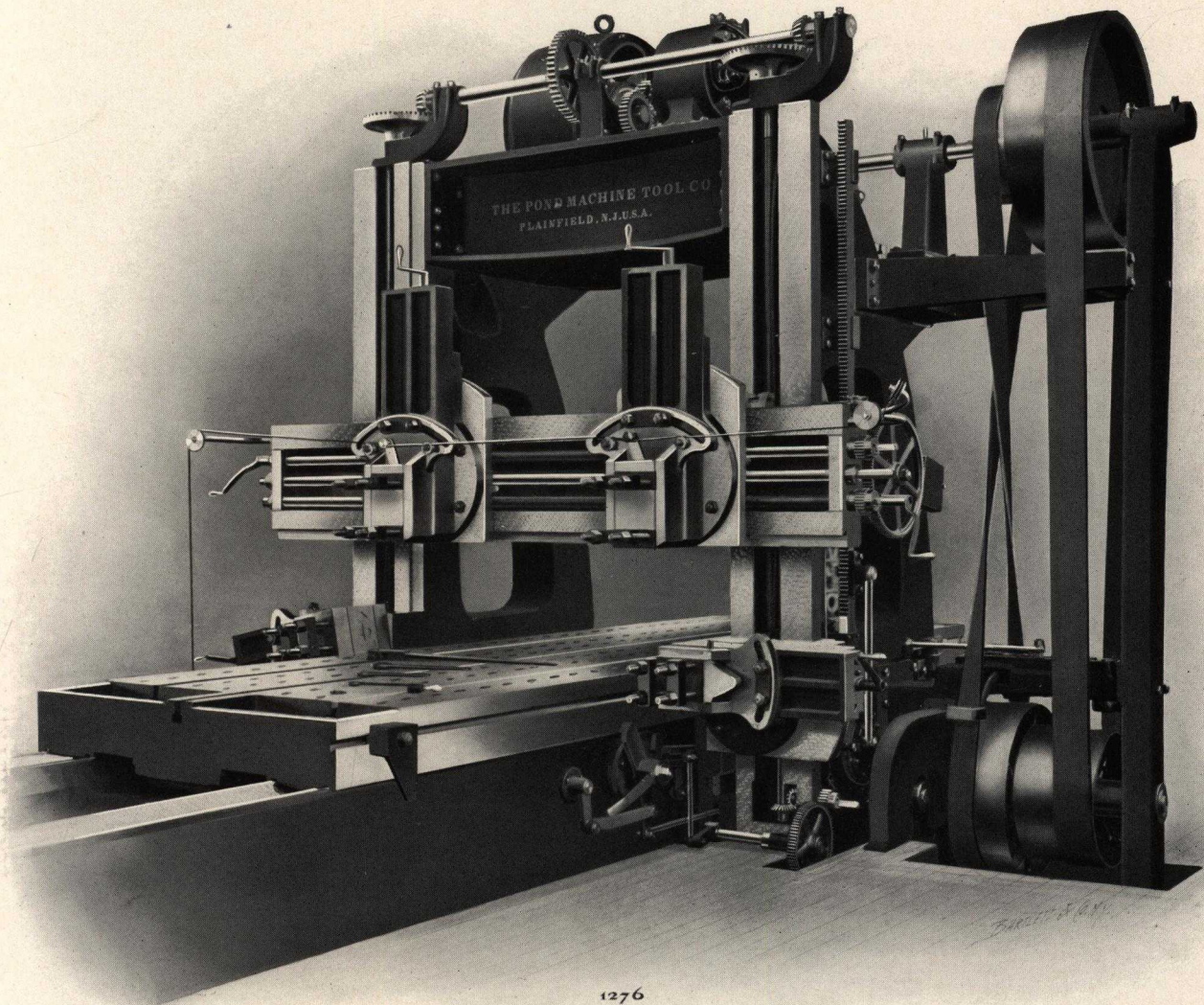
Besides the two heads on the cross-rail, two side heads are provided which have compound and swivel motion and automatic variable feed in either direction from below table to highest position of cross-rail.

Planes 43 inches wide, 43 inches high, and may be built to plane any desired length.



1281

42-INCH POND FORGE PLANER



1276

72-INCH POND FORGE PLANER

72-INCH POND FORGE PLANER

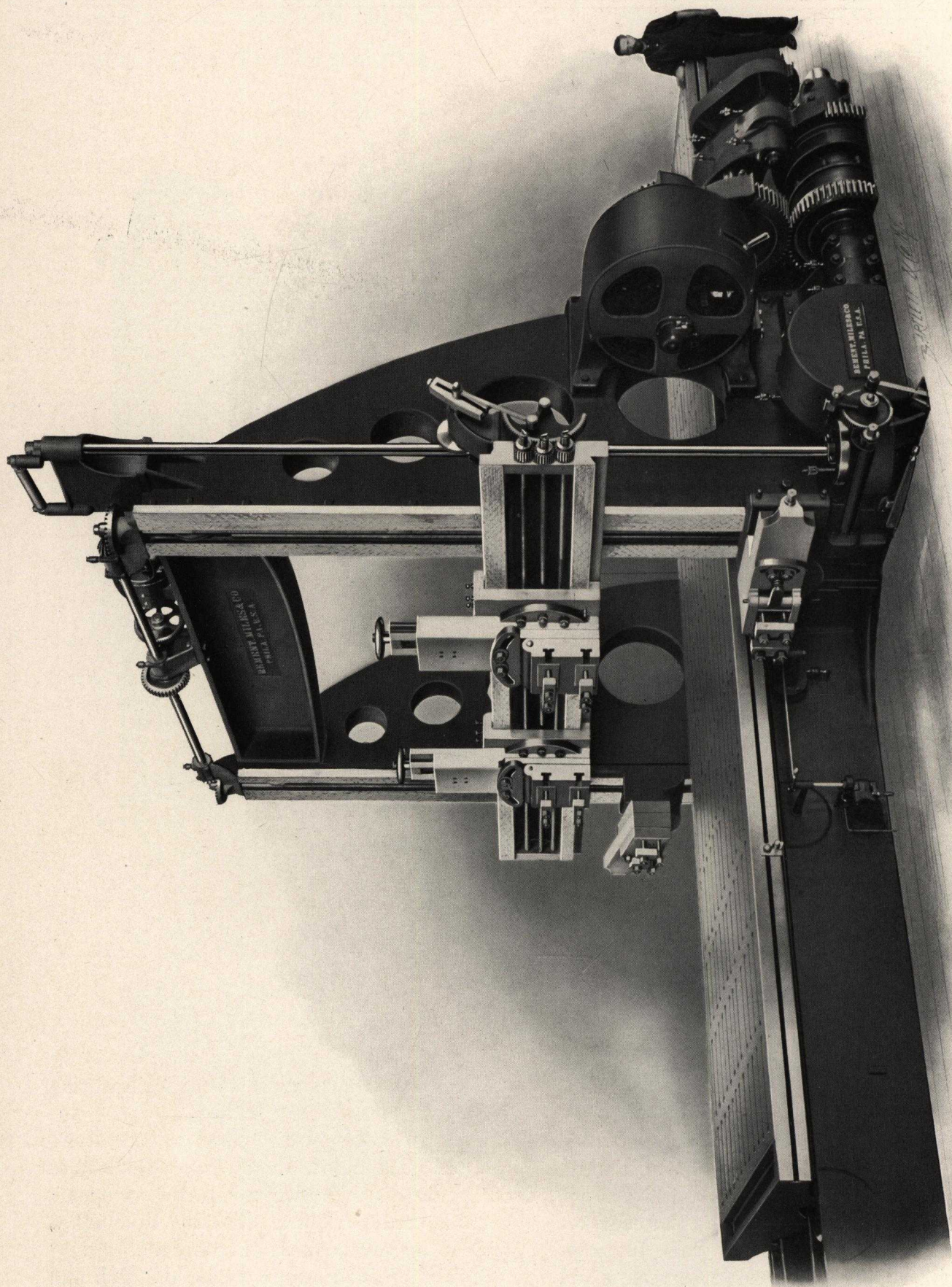
This machine is of exceptional weight and rigidity, and is adapted to heavy forge work.

There are no overhung shafts or pulleys. The main drive motor is of 35-horse-power capacity and is mounted on top of the housings. An auxiliary motor is provided for raising and lowering the cross-rail. Both the cross-rail and the housings have very wide bearing

surfaces and are of heavy construction, insuring great rigidity under the heaviest cuts.

In addition to the two heads on the cross-rail, two side heads are provided which have compound and swiveling motion and automatic variable feeds in either direction from below table to highest position of cross-rail.

Planes 73 inches wide, 73 inches high and 16 feet long, but may be built to plane any desired length.



1346

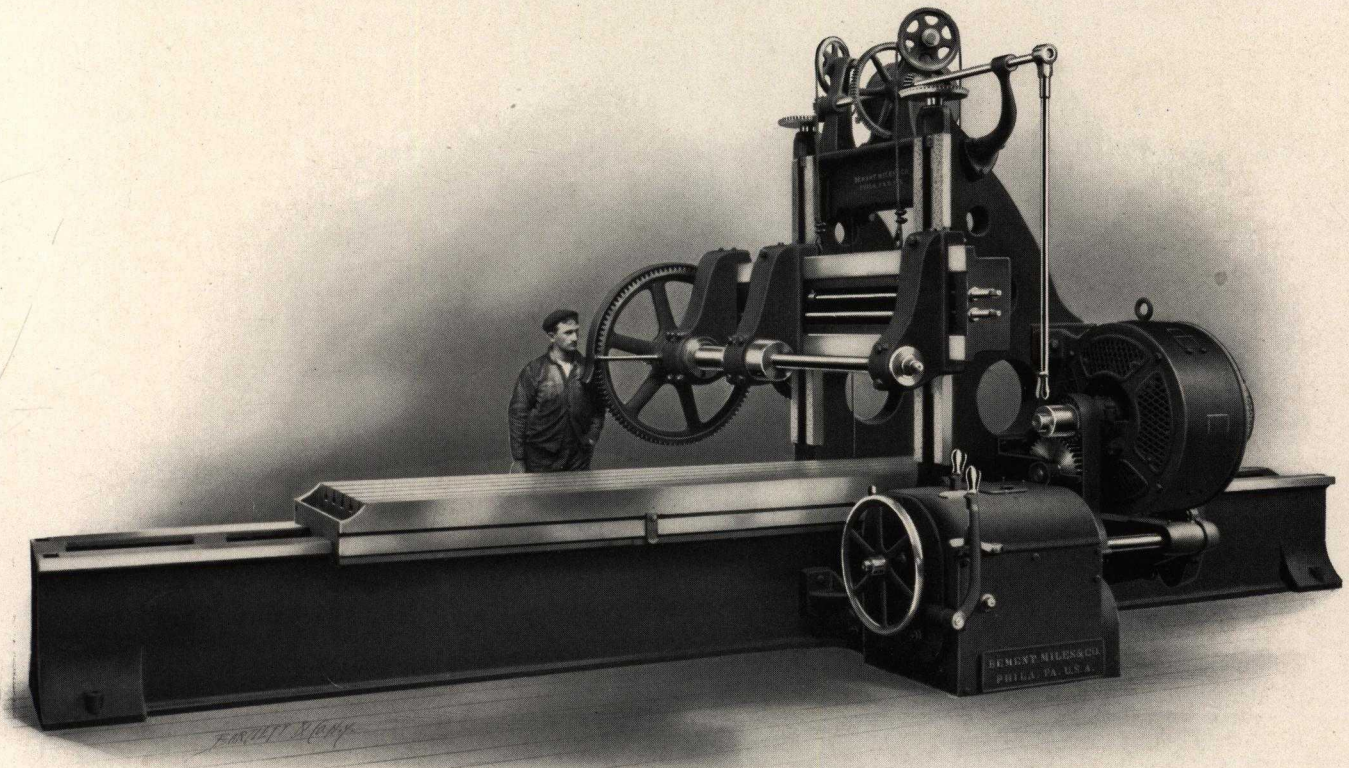
10-FOOT HEAVY PLANER : AIR CLUTCHES

10-FOOT PLANING MACHINE

The 10-foot planer on the opposite page is driven by a 60-horse-power direct-connected electric motor through pneumatic clutches. Cutting speeds of the machine are variable by change gears from 18 to 36 feet per minute. By increasing the speed of the motor a proportionate increase in the cutting speeds and return movement up to any desired amount may be secured. A light and neat handle at the operator's position is provided for reversing the table travel. This handle is connected with the air valve.

No. 6 BEMENT HORIZONTAL MILLING MACHINE

Our new type of Horizontal Milling Machine has several points of interest. The machine illustrated is driven by 25-horse-power motor with speed variation from 560 to 1120 revolutions. This range of speeds in conjunction with the changes by gearing gives a speed range for the spindle of from 8 to 36 revolutions per minute. The cross-rail is raised and lowered by a $3\frac{1}{2}$ -horse-power motor mounted on the top of the housings. The cross-rail is counterweighted and is so arranged that the

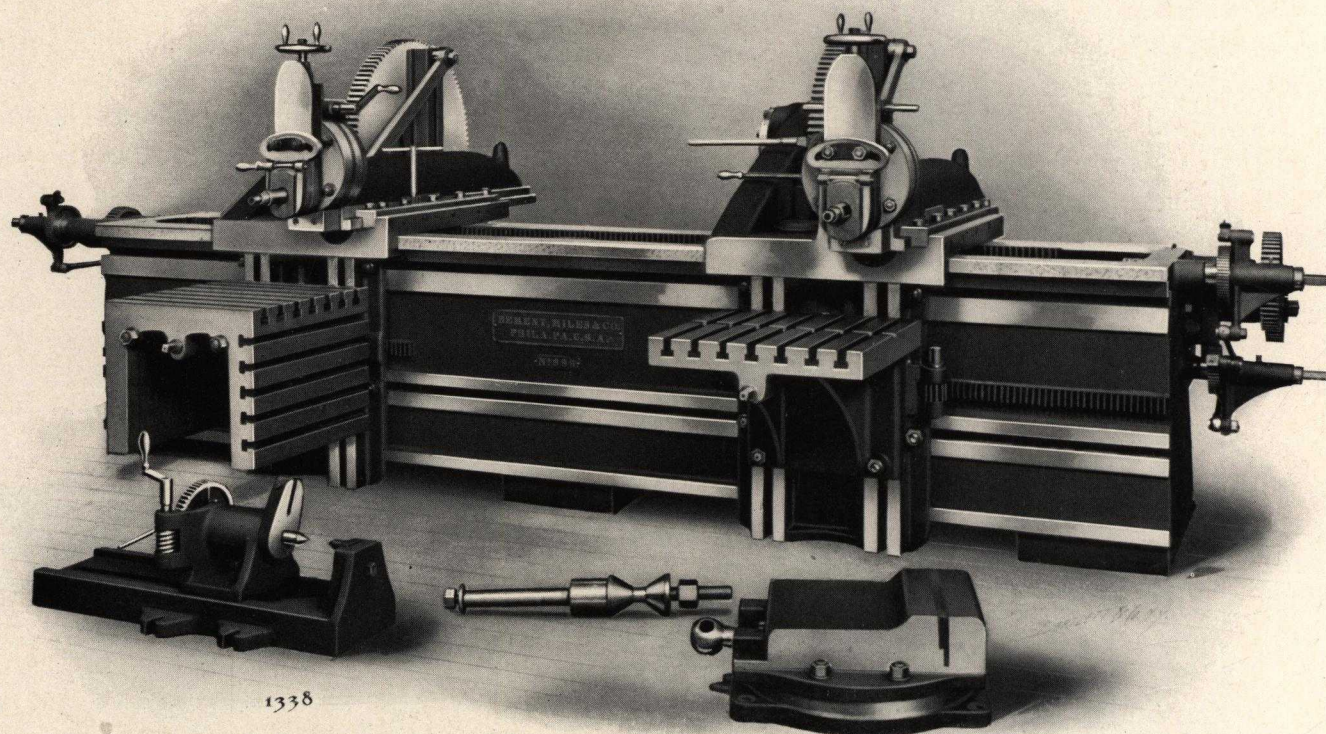


1342

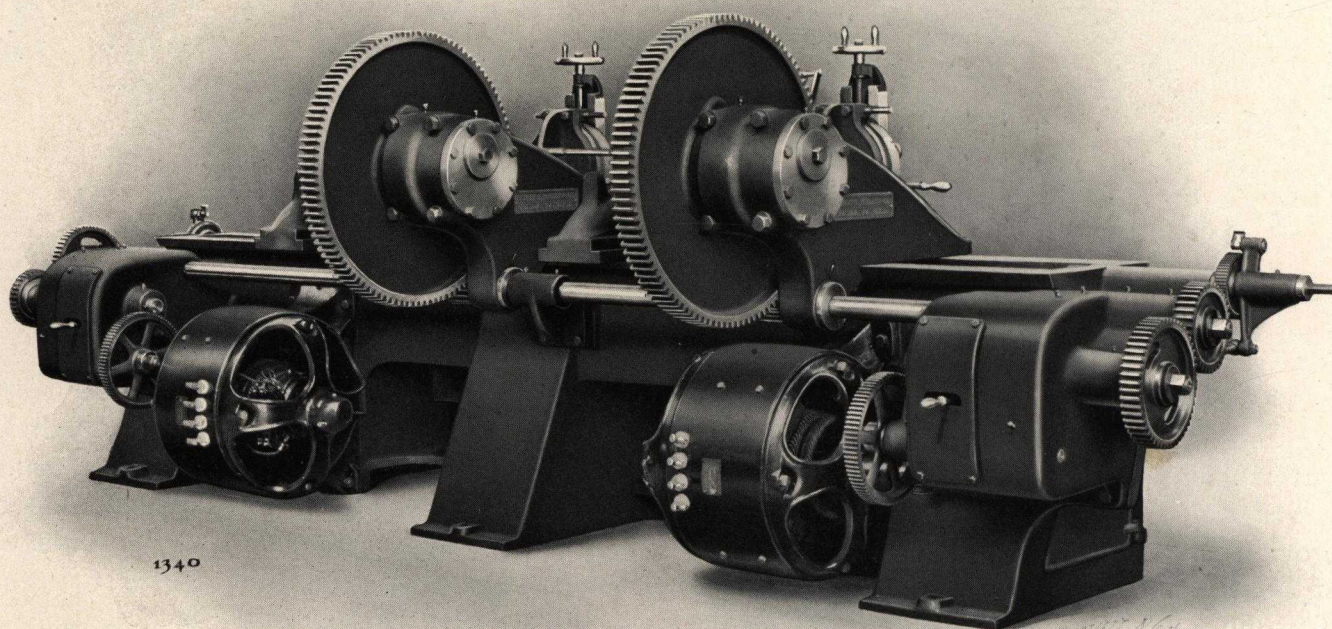
No. 6 BEMENT HORIZONTAL MILLING MACHINE

A 5-horse-power motor is furnished for raising and lowering the cross-rail. The power traverse for the heads on the cross-rail and power vertical traverse for the tool slides is provided for by a 3-horse-power motor mounted at the left-hand end and back of the cross-rail. This motor engages with the screws and spline shafts in the cross-rail. Quick traverse for the side heads is provided by a 3-horse-power motor mounted on the left-hand housing.

bearing for the outer end of the mandrel may be traversed entirely free of the mandrel, allowing the easy insertion of different mandrels. Feeds are positively driven by gearing and are variable throughout a wide range. Dimensions of the machine are as follows: Width between uprights, $37\frac{1}{2}$ inches. Maximum height of spindle above table, $37\frac{1}{2}$ inches. Cutters up to 16 inches in diameter may be used.



26-INCH BEMENT DOUBLE SHAPING MACHINE—FRONT VIEW

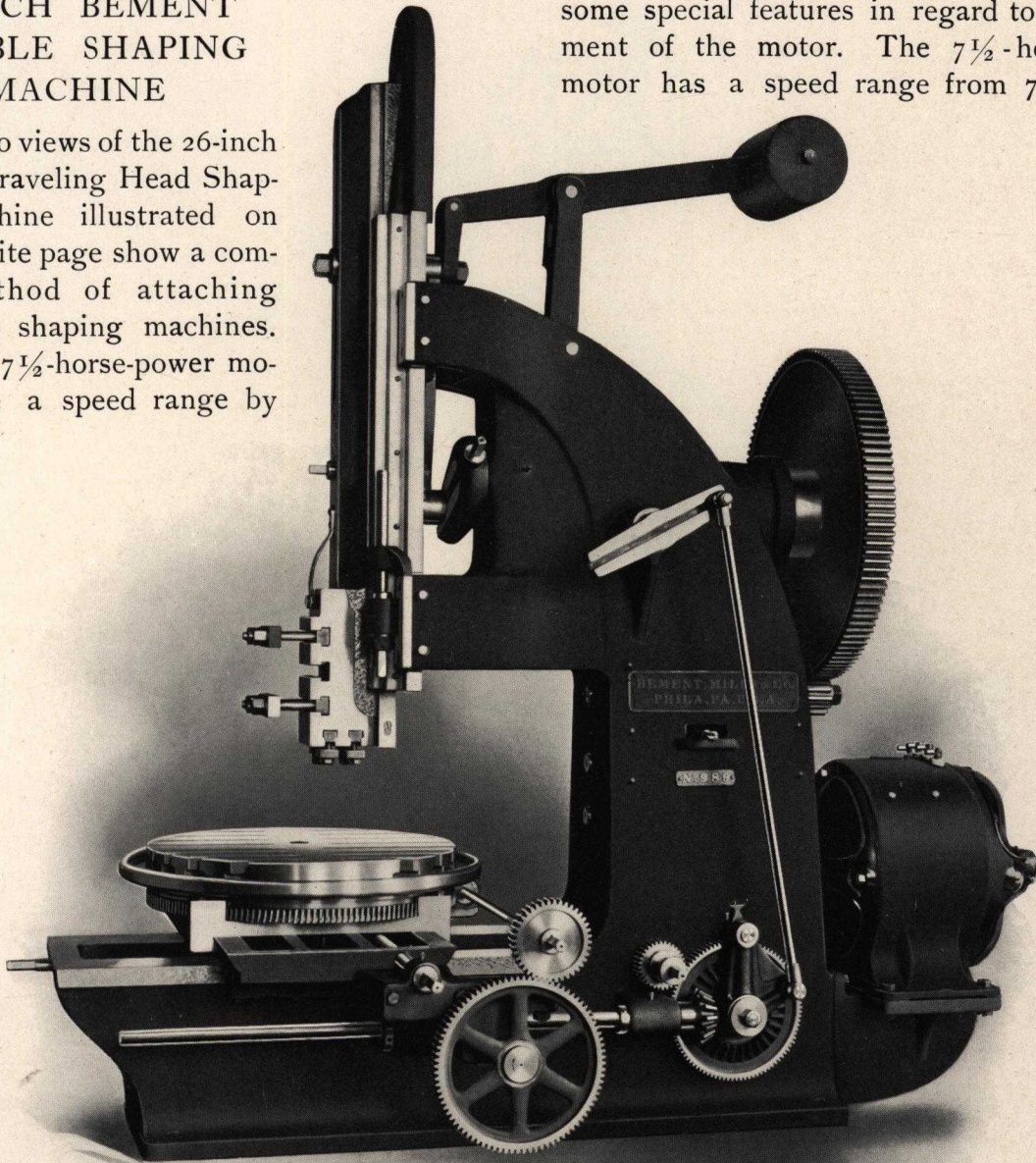


26-INCH BEMENT DOUBLE SHAPING MACHINE—BACK VIEW

26-INCH BEMENT DOUBLE SHAPING MACHINE

The two views of the 26-inch Double Traveling Head Shaping Machine illustrated on the opposite page show a compact method of attaching motors to shaping machines. The two $7\frac{1}{2}$ -horse-power motors have a speed range by

some special features in regard to the attachment of the motor. The $7\frac{1}{2}$ -horse-power motor has a speed range from 700 to 1400



1336

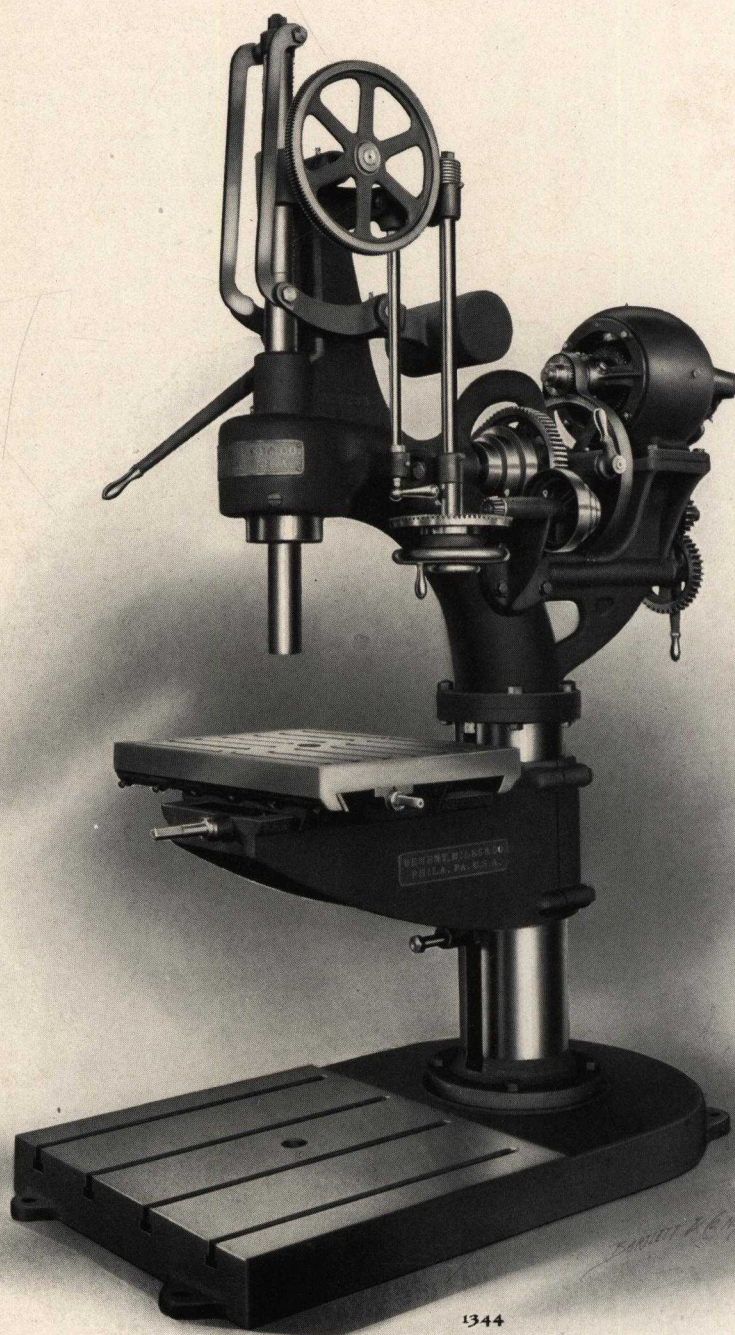
18-INCH BEMENT SLOTTING MACHINE

field control from 700 to 1400 revolutions per minute, and with speed changes by gearing the machine will give from 4 to 40 strokes per minute. The front view of the machine shows index centers and vise and cone arbor in the foreground.

18-INCH BEMENT SLOTTING MACHINE

The 18-inch Bement Slotting Machine with spring relief tool apron illustrated above has

revolutions per minute and is mounted on a bracket at the rear of the frame and is connected with two sets of gears within the frame. Between these sets of gears inside the frame is a clutch with a lever extending to the operating side. With the motor speed range and the two runs of gears, cutter bar strokes from $6\frac{1}{2}$ to 29 are obtainable. In testing this machine on steel with the heaviest cut the motor indicated 34 horse-power, showing an ample factor of safety for the machine.



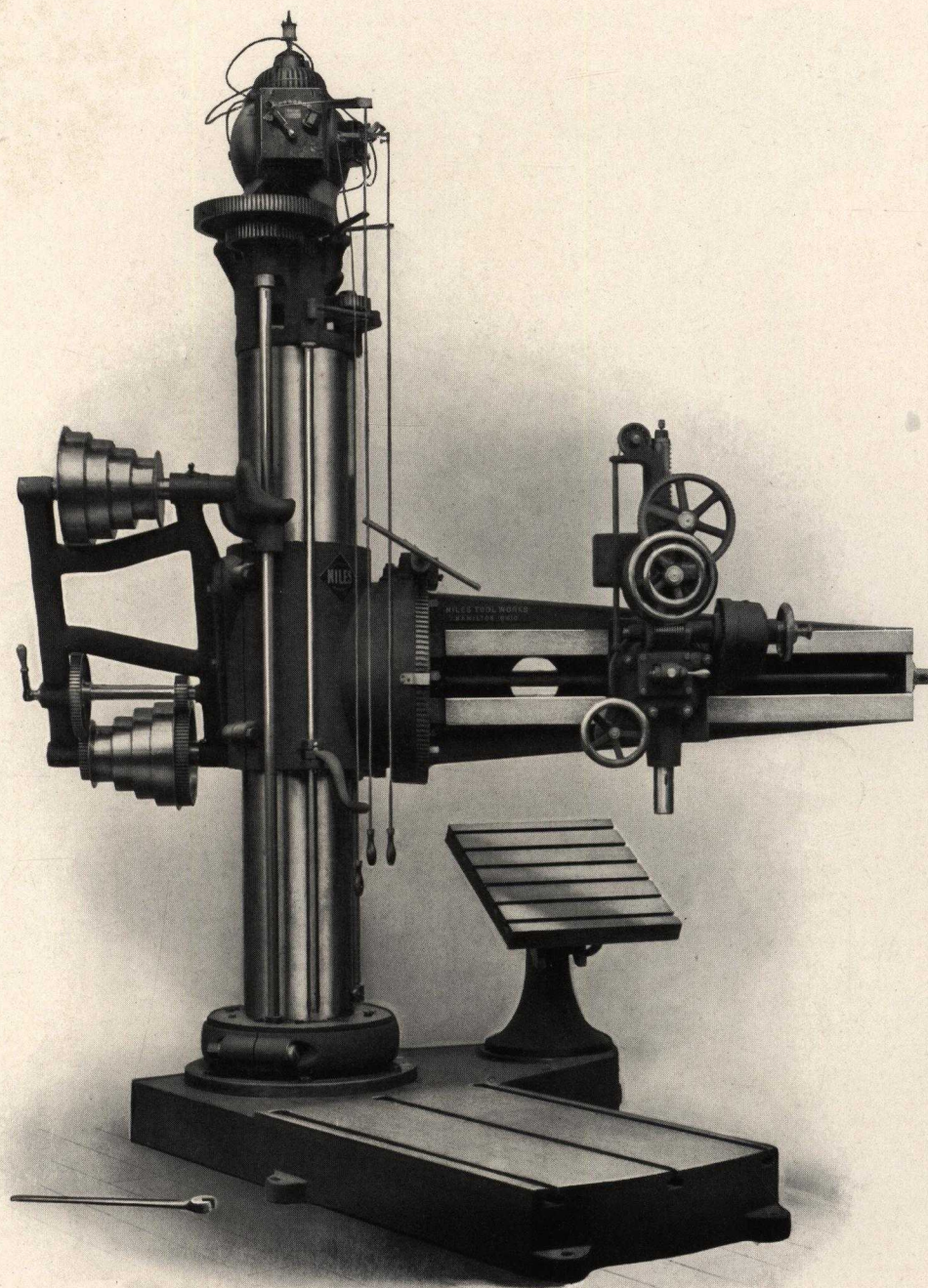
50-INCH VERTICAL DRILL

50-INCH VERTICAL DRILL

The motor for driving this drill has a speed range from 350 to 1750 revolutions per minute by field control, giving in combination with changes by gears, spindle speeds from $8\frac{1}{2}$ to 220 revolutions per minute. It is of $2\frac{1}{2}$ -horse-power capacity. Spindle is counter-weighted and has power and hand feeds and

rapid vertical adjustment by hand lever. The table has compound slides and vertical adjustment by power. Dimensions of the machine are as follows: Distance from center of spindle to column, 25 inches. Greatest distance from spindle to table, $31\frac{1}{2}$ inches; to base, 58 inches. Spindle has 18-inch traverse.

The neat way in which the motor is applied to this machine makes a very symmetrical design.



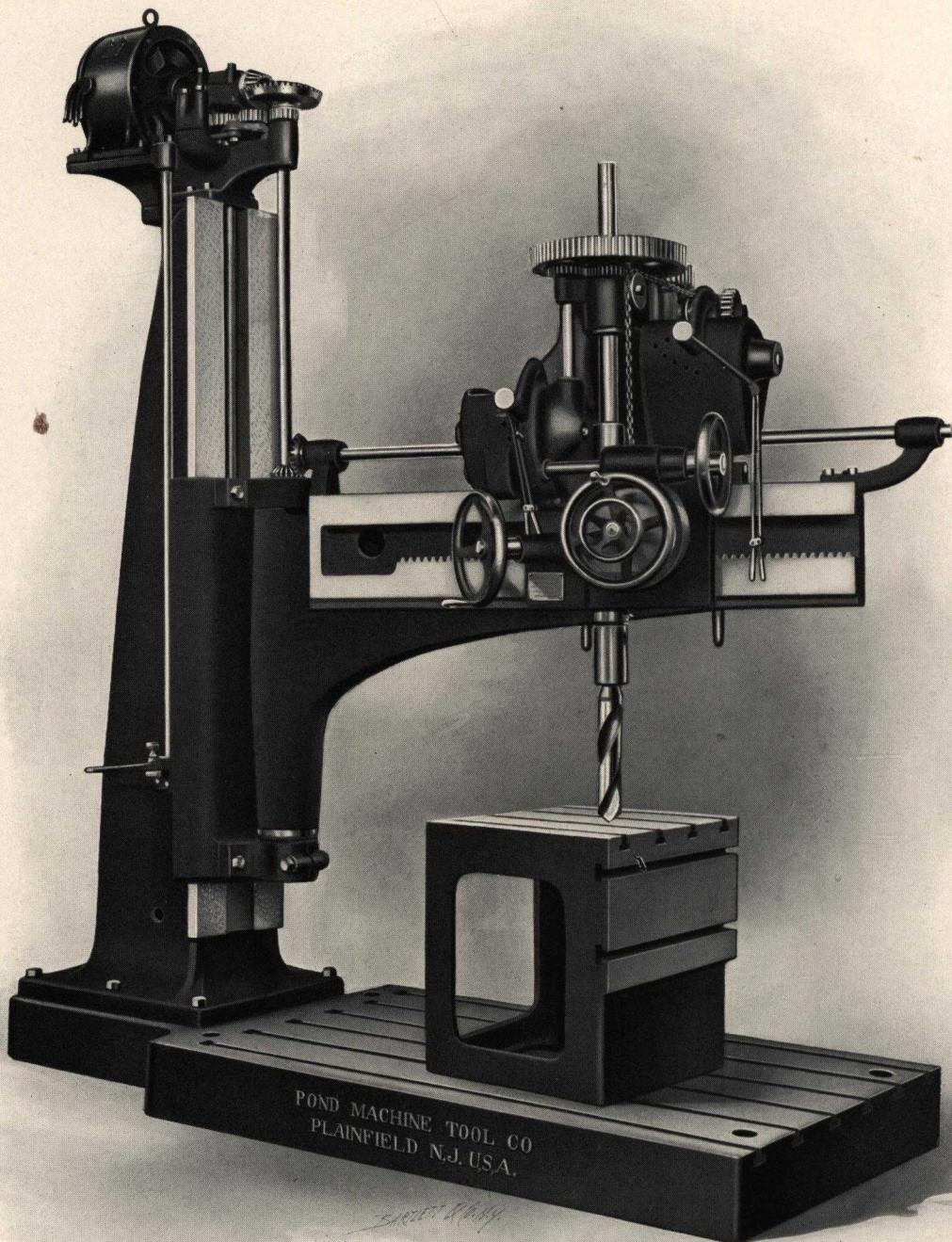
10158

5 1/2-FOOT UNIVERSAL RADIAL DRILLING MACHINE

5 1/2-FOOT UNIVERSAL RADIAL DRILLING MACHINE

This machine is provided with reversing gears in the head for tapping. The motor is mounted on the top of the column and is operated by pendant cords. The dimensions of the machine are as follows: Will drill to the center of an

11-foot circle. Greatest distance from face of column to center of spindle, 67 inches. Greatest distance from base-plate to spindle, 67 inches. Traverse of spindle, 14 inches. The base is slotted for bolting work, and has an extension on which a swiveling and rotating table is mounted. The base of the column is of new design.



1278

GEAR-DRIVEN POND RADIAL DRILLING MACHINE

6-FOOT POND GEAR-DRIVEN RADIAL DRILL

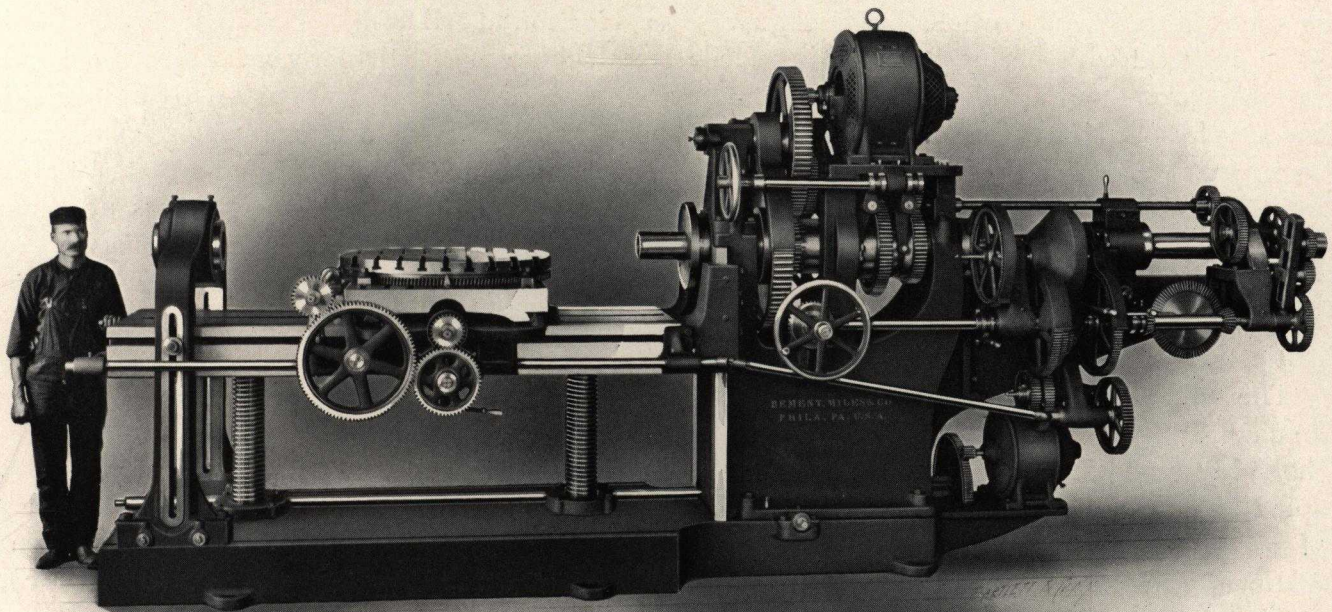
This drill is of new design and is driven by a constant-speed electric motor. Spindle has 16 changes of speed in both directions and 8 changes of feed, any of which may be obtained by the operator without his leaving his position at the work and without stopping the motor.

Vertical travel of the arm on the upright, 48 inches. Spindle traverse, 18 inches. Greatest height from floor plate to end of spindle, 89 inches. Shortest radius of spindle, 22 inches; longest radius of spindle, 72 inches. Shortest distance from face of upright to drill, 30 inches.

The traverse of the saddle on the swinging arm and the traverse of the counterweighted spindle is by means of rack and pinion so

placed that the workman can operate both and swing the arm at the same time, enabling the drill to be brought to the work very quickly and easily. If desired this drill may be built with constant-speed belt drive, instead of motor drive.

spindle sleeve, which in combination with the regular back gears gives spindle speeds ranging from 1.9 to 198 revolutions per minute. Spindle has a total traverse of 72 inches. Greatest distance from center of spindle to main table, 41½ inches. Main table is 9 feet



1348

No. 4 BEMENT HORIZONTAL BORING AND DRILLING MACHINE

No. 4 BEMENT HORIZONTAL BORING AND DRILLING MACHINE

Spindle is 5½ inches in diameter and is driven by a 7-horse-power motor which has a speed range from 590 to 1180 revolutions per minute. It is mounted above the headstock and gears directly to the spindle sleeve. There are three changes of speed by gearing on the

long and is raised and lowered by 4¾-horse-power motor, which is geared to the lifting worm shaft.

The machine is equipped with screw-cutting attachment, and round table having cross and circular milling feeds. The yoke is mounted on rollers with stiff springs over them to raise the yoke slightly off the bed plate when the bolts are loosened, making it very easy to adjust.

A HEAVY HORIZONTAL BORING, DRILLING AND MILLING MACHINE

This machine is designed for the heaviest boring and milling work. The spindle is $9\frac{1}{2}$ inches in diameter, has a traverse of 72 inches and a range of speeds from 1 to 50 revolutions per minute. It is driven either by face-plate gear, to which boring bars and large milling cutters may be bolted, or by a smaller gear, which in the illustration is covered by gear guards. It is provided with boring and drilling feeds variable throughout a wide range. The motor has a wide speed variation and drives through back gears and sliding gears. The counter-weighted saddle has a vertical adjustment by power of 8 feet and the column a traverse of 12 feet on the bed. Both the saddle and column have power milling feeds with automatic stops and quick power traverse.

The spindle, saddle and column feeds may be changed or reversed, the quick traverse of the saddle or column may be controlled, and the spindle may be started, stopped, or its direction of rotation reversed, all from the operator's platform, which is attached to the saddle.

The machine is self-contained in that the motor and all the driving gear move with the column. The bed may be of any length.

Attached to the bed of the machine is a floor plate carrying an out-board column and a square table upon which turns an 8-foot octagonal table. The octagonal table has a circular base graduated in degrees and is provided with four stops in quadrature. These stops can be brought into contact with a test indicator reading in thousandths of an inch, which insures absolute squareness of work being milled.

Scales are provided on the bed and columns and also on the saddle carrying the out-board bearing, thus enabling the spindle to be set without measuring.

The main driving motor is of 30-horse-power capacity at 240 volts. It is designed to be used on the 3-wire multiple voltage system of 90, 160 and 250 volts, giving a speed range of 200 to 800

revolutions per minute. The motor for power traverse of the circular table and of the table base is of 6-horse-power capacity and is a constant speed motor.

This machine is designed for boring, drilling and milling work which is too large to be conveniently handled on other types of machines. The work is bolted to the table and at one setting of the work flanges may be faced, surfaces milled, and a number of parallel holes drilled and bored. As a milling machine the Horizontal Boring, Drilling and Milling Machine is particularly valuable where castings have numerous spots to be finished which are distributed over a large surface, or are difficult to reach, or stand at awkward angles, as in such cases a planer is at a great disadvantage. The rotary table may be used to advantage for finishing surfaces or boring holes which are at fixed angles.

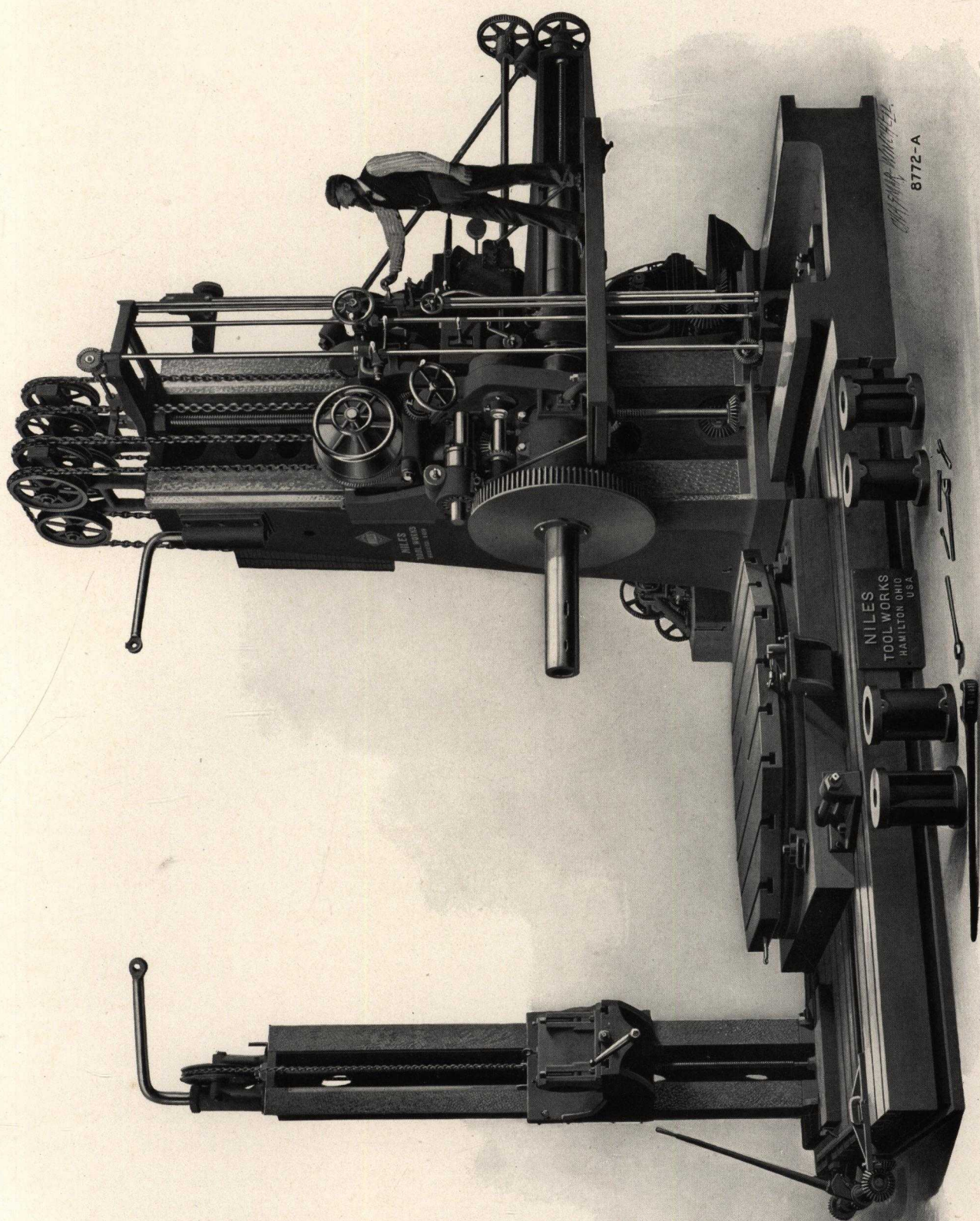
ERECTION OF THE EXHIBIT

The erection of 868 tons of machinery, even under the most favorable conditions, is not an easy task, and in the Palace of Machinery, we found the installation of our exhibit a very difficult proposition. Everything was new and untried; there was no overhead crane, the runways of our 40-ton crane did not extend as far as our exhibit; and the labor market was in a more or less unsettled condition.

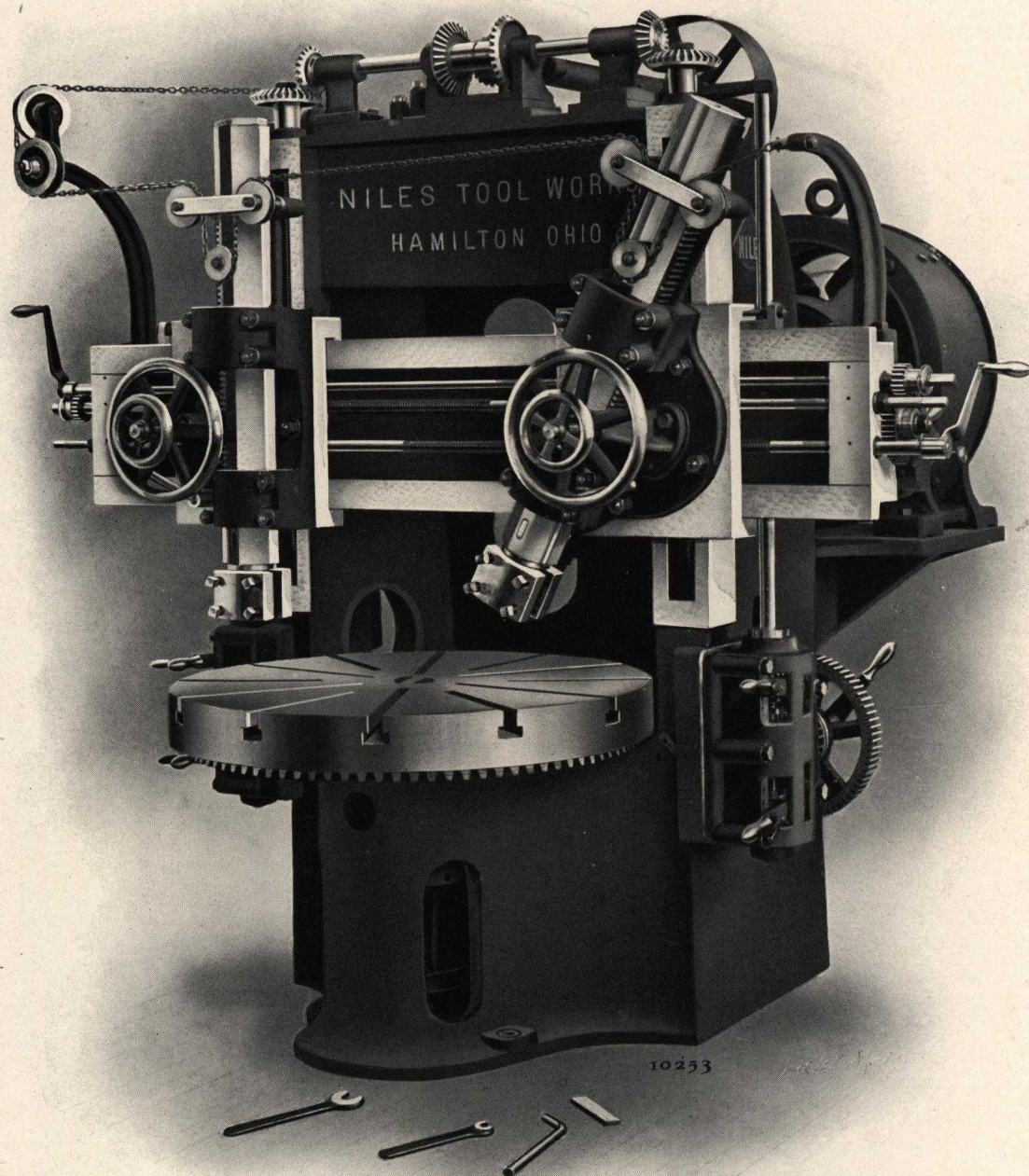
With the small machines, of course, there was comparatively little trouble, as they were shipped practically complete, but with the larger machines, where each part formed a carload, the work entailed in the erection was very great.

The total weight of the Niles 20-foot Boring and Turning Mill is about 200 tons and each housing weighs 18 tons. The only means available for lifting these housings was a 15-ton track crane, the track for which was on none too firm a foundation.

The crane stood the test, however, and the big mill was successfully erected. After that the erection of the other machines seemed easy in comparison.



HEAVY HORIZONTAL BORING, DRILLING AND MILLING MACHINE



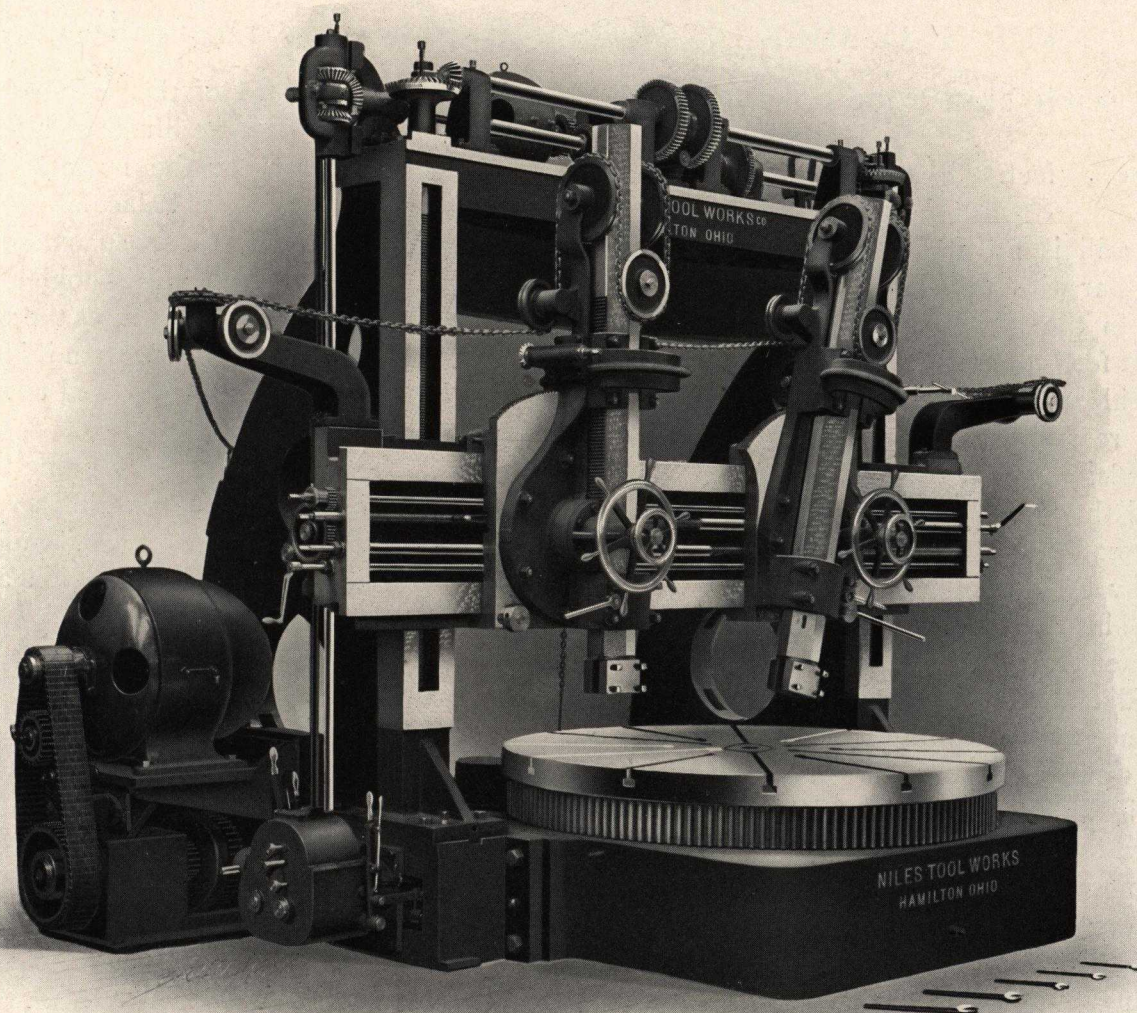
37-INCH NILES BORING AND TURNING MILL

37-INCH NILES BORING AND TURNING MILL

The motor for driving this mill is designed for the 3-wire system, using from 110 to 220 volts, and has a speed variation of 310 to 1240 revolutions per minute. It is good for 5 horsepower at any point of its range. The speed

variations of the motor, combined with changes by gearing, give a wide range of speeds to the table. Nested gear feeds to bars are independent in rate and direction.

Swing, 37 inches. Greatest height under tools, 24 inches. The bed, housings, back and top brace are made in a single casting, making it an exceedingly rigid machine.



10166 A

10-FOOT NILES EXTRA-HEAVY BORING AND TURNING MILL

10-FOOT NILES EXTRA - HEAVY BORING AND TURNING MILL

For work on which it is possible to take the heaviest cuts with modern tool steels, we offer the newly-designed boring mill illustrated above. This machine is of great weight and all its details are carefully designed to give the maximum rigidity.

The saddles are very heavy and have rapid traverse by hand and power, so that they can be easily and quickly moved. The system of counterweighting for the tool bars is so arranged that the chain is carried back out of the way of the operator.

The driving mechanism of this mill is of ample strength throughout. The main driving motor has a rated output of 35 horse-power, at 220 volts, and has a speed variation by the multiple voltage system in combination with field regulation from 350 to 1050 revolutions per minute.

The table, which is of large diameter, is driven by a pinion meshing with an external gear. The feeds are positively driven by gearing and are entirely independent for each head. An auxiliary $7\frac{1}{2}$ -horse-power motor running at 875 revolutions per minute is used for elevating the cross-rail and for the quick traverse of the saddles.

NILES 20-FOOT BORING AND TURNING MILL

WITH REAR TOOL COLUMN

Swing, 20 feet. Greatest height under tools, 15 feet.

The mill is provided with a 20-inch central boring bar with traveling heads which is not shown in the illustration. The bar has independent feeds operated from below. The head has rapid power traverse of 12 feet.

The rear tool column for work on heavy fly-wheels, rope-wheels, etc., is placed at the back of the mill. It may be adjusted in and out so that diameters from 20 feet down to 14 feet may be turned without overhang of the tool. The tool slide has a 7-inch in-and-out adjustment, vertical feed, hand feed and quick hand adjustment. It is provided with a taper attachment for turning tapers up to three degrees in either direction. The taper attachment is arranged so that the tool may be adjusted for depth of cut and reset without interfering with the attachment. For turning diameters less than 14 feet an auxiliary tool bar may be attached to the rear tool slide, and when so arranged the tool bar has a horizontal power feed of 30 inches. For facing the inside of fly-wheel rims and similar work the auxiliary tool bar may be blocked up at any convenient position near the mill.

The main heads have rapid power traverse and are particularly strong and heavy. All the arrangements necessary for the easy handling of these parts are provided. The machine is driven by a variable-speed motor, and an auxiliary motor is provided for elevating the cross-rail. The main driving motor is 80 horse-power and has a speed variation of 150 to 600 revolutions per minute, which is obtained partly by changing the voltage from 110 to 220 volts, and partly by field control. The motor for elevating the cross-rail and for the quick traverse of the heads is of 10 horse-power capacity.

The approximate weight of this machine with rear tool column and central boring bar is about 200 tons.

PRATT & WHITNEY EXHIBIT

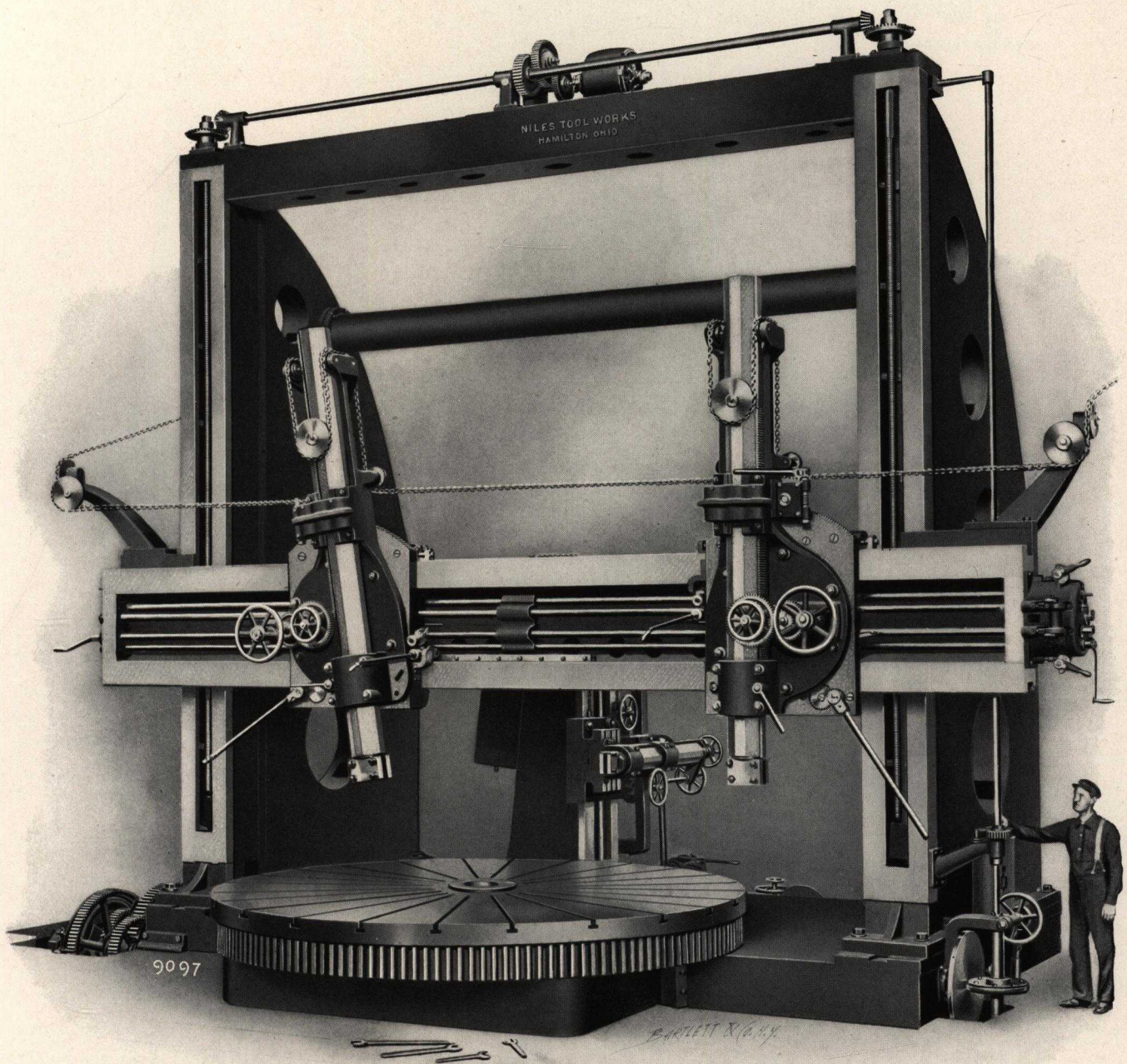
WORLD'S FAIR, ST. LOUIS

On pages 31 to 36 of this number of THE PROGRESS REPORTER, we illustrate a few of the machines exhibited by the Pratt & Whitney Company in Section 17, Palace of Machinery, St. Louis. Their exhibit is so extensive that we have published a little booklet entitled "New Designs," which illustrates the machines they are exhibiting more fully than it is possible to do here. We should be pleased to send this booklet on request.

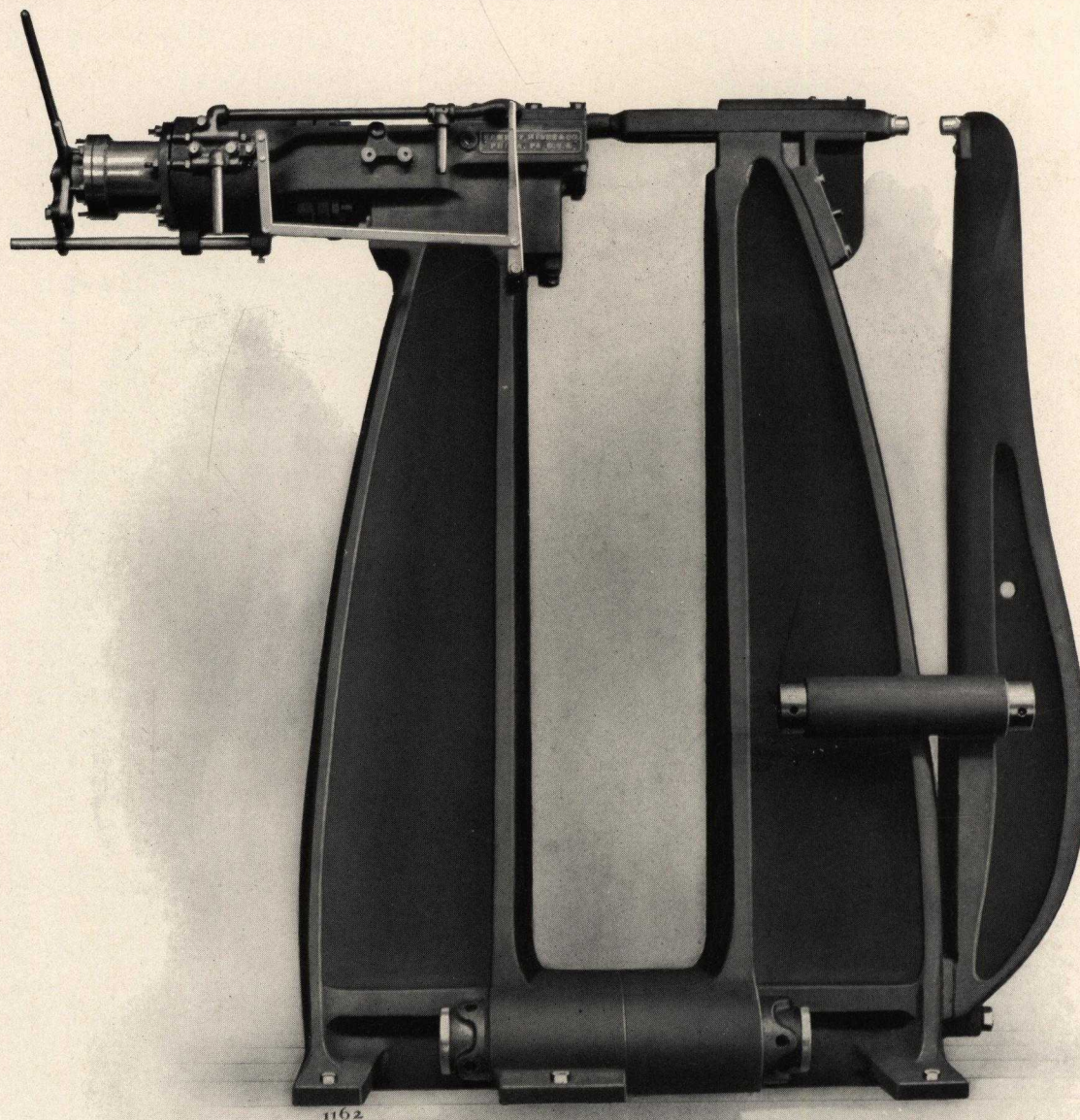
Besides more than thirty machine tools, the Pratt & Whitney exhibit contains a very complete collection of small tools, gauges and measuring machines, a few of which are illustrated on the back cover.

The machine tool part of the Pratt & Whitney exhibit includes the following machines:

- 3 x 36-inch New Model Turret Lathe.
- 2 x 26-inch New Model Turret Lathe.
- 1 1/2 x 18-inch New Model Turret Lathe.
- 1 x 10-inch New Model Turret Lathe.
- 5/8 x 4 1/2-inch New Model Turret Lathe.
- 14-inch Engine Lathe.
- 10-inch x 5-foot Tool-makers' Lathe.
- Two 7 x 32-inch Bench Lathes.
- No. 14 Automatic Screw Machine for Rod Work.
- No. 14 Automatic Screw Machine with Magazine Attachment.
- 6 x 132 Thread Milling Machine.
- 6 x 48 Thread Milling Machine.
- Thread Milling Machine Cutter Grinder.
- Case of Thread Milling Machine Samples.
- Gun Barrel Drilling Machine.
- Gun Barrel Drill Grinder.
- No. 12 Profiling Machine.
- No. 13 Profiling Machine.
- Four-spindle Sensitive Drill.
- One-spindle Sensitive Drill.
- High-speed Turning Lathe, driven by direct-connected 5-horse-power motor.
- No. 3 Cutting-off Machine, driven by direct-connected 5-horse-power motor.
- No. 3 Rifling Machine.
- No. 2 Die Sinker.
- No. 11 Multiple Spindle Drill.
- No. 13 Multiple Spindle Drill.
- No. 2 Hand Milling Machine, with overhanging arm.
- No. 12 Lincoln Milling Machine.
- Whitney Water Grinder.
- No. 1 Centering Machine.
- Vise Bench.
- Chucks.



20-FOOT NILES BORING AND TURNING MILL WITH REAR TOOL COLUMN



BEMENT TRIPLE-PRESSURE HYDRAULIC RIVETER

BEMENT TRIPLE-PRESSURE HYDRAULIC RIVETING MACHINE

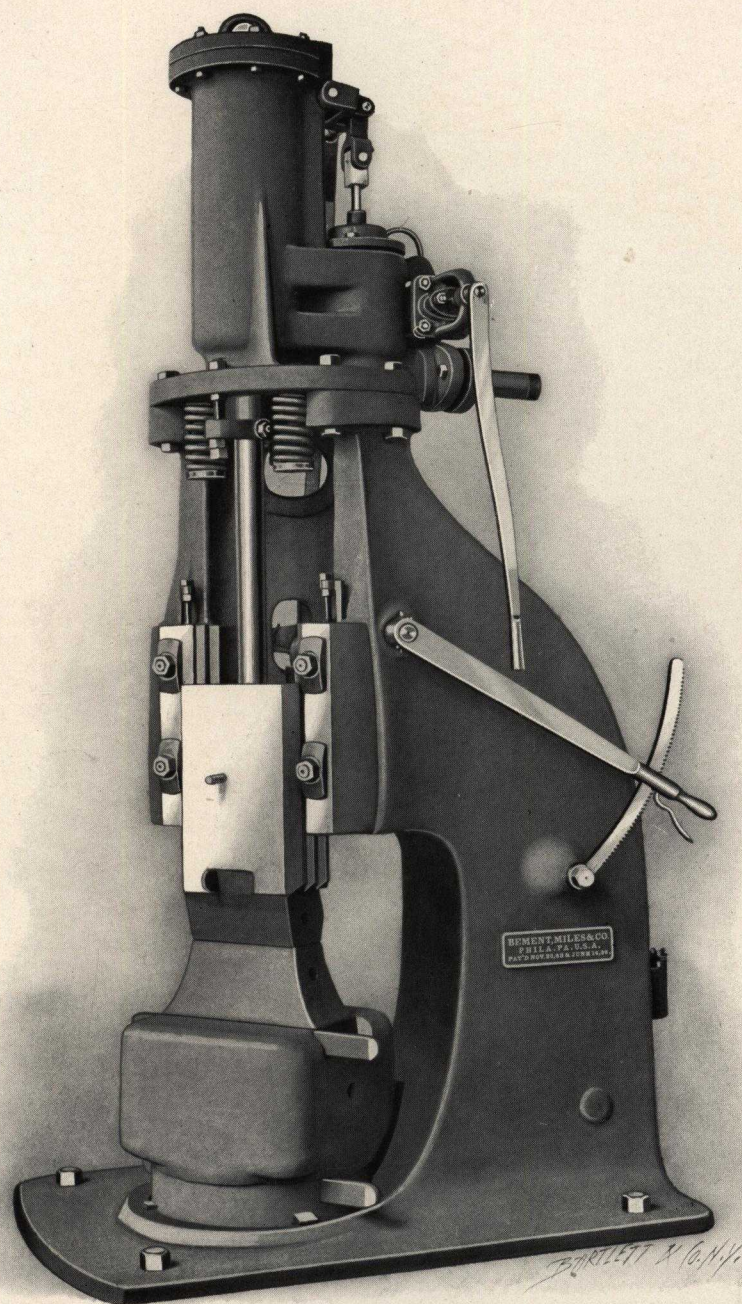
WITH AUXILIARY STAKE

At the St. Louis Exposition we are exhibiting only the patented triple-pressure cylinder of the machine illustrated above.

It is designed for water pressure of 1500 pounds to the square inch. The three pressures are obtained by a main plunger for the maximum pressure, and two auxiliary plungers which can be locked separately or together to

the main plunger. By this arrangement a simple two-way valve is used. The usual distributing valve is dispensed with, thus reducing the number of water joints and cost of maintenance to a minimum. All packings are hemp and outside the cylinder, making them accessible for renewals.

The auxiliary stake for riveting flues has a depth of throat somewhat less than the main gap and may be quickly removed so that the machine can be used in the ordinary way. The gaps usually furnished are 10, 12 and 15 feet.

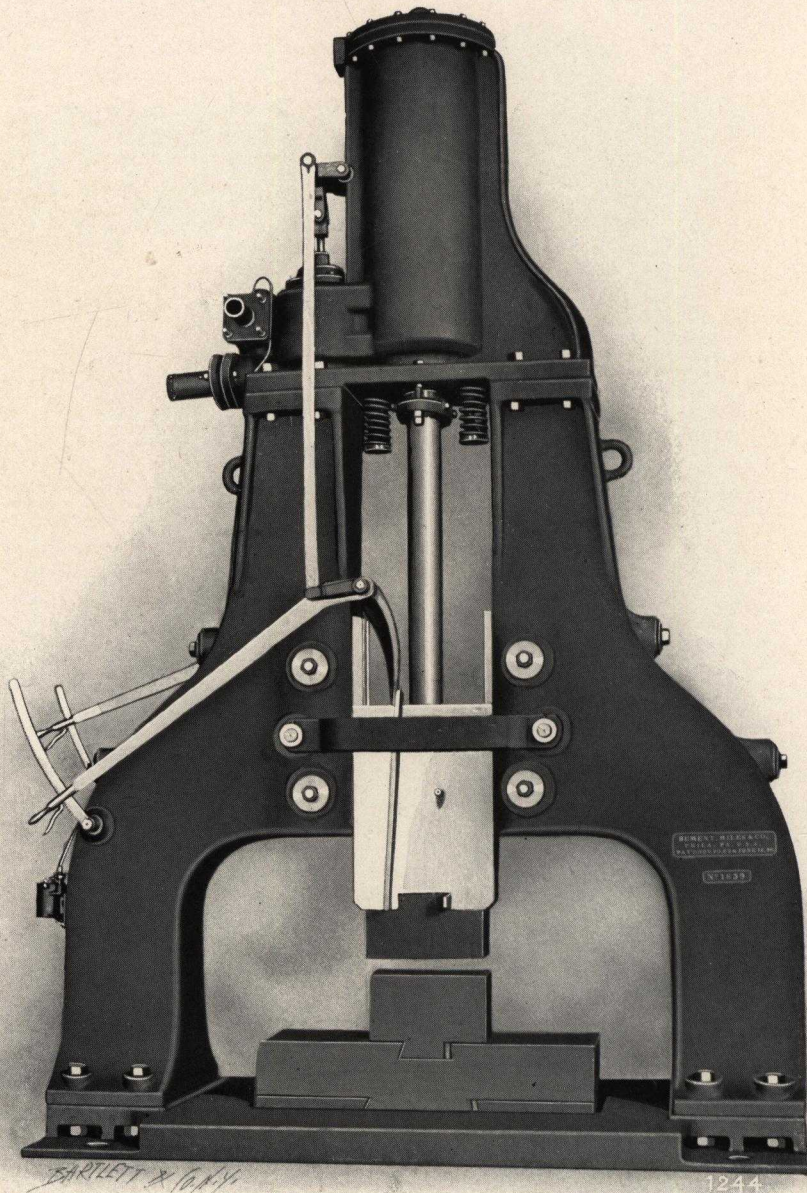


800-POUND BEMENT SINGLE-FRAME STEAM HAMMER

800-POUND BEMENT SINGLE-FRAME STEAM HAMMER

This hammer is rated by the weight of the ram and the attached parts and takes steam above and below the piston. The ram and guides are set diagonally to the frame at the proper angle for drawing and finishing. The guides are adjustable. The valve is perfectly balanced and the valve gear is simple and substantial and operates either automatically or

by hand, producing by means of a single lever and the amount of steam turned on every desired variation in length, position, rapidity and force of blow. Steel spiral springs are used for safety buffers to prevent damage in careless handling. Dimensions of machine are as follows: Diameter of cylinder, 8 inches. Length of stroke, 22 inches. Usual die face, 5 x 12 inches. The anvil is made with separate cap which can be removed without disturbing the hammer.



5000-POUND BEMENT DOUBLE-FRAME STEAM HAMMER

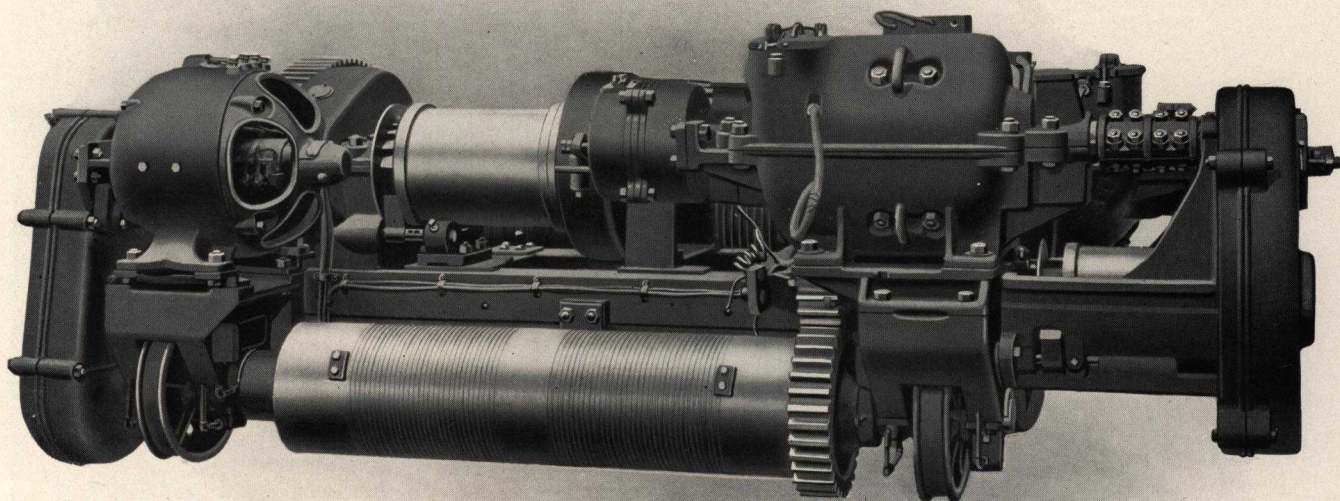
5000 - POUND BEMENT DOUBLE-FRAME STEAM HAMMER

Dimensions of the hammer are as follows: Diameter of cylinder, 18 inches. Length of stroke, 48 inches. Usual die face, 13 by 24 inches. This hammer is rated by the weight of the ram and attached parts, and takes steam above and below the piston. The valve is perfectly balanced and the valve gear is simple and substantial and operates either automatically or by hand, producing every desired variation in length, position, rapidity and force of blow. The guides are adjustable at the top and bot-

tom independently, so that all wear can be taken up. The piston can be raised above the top of the cylinder for the insertion of rings without separating the rod from the ram.

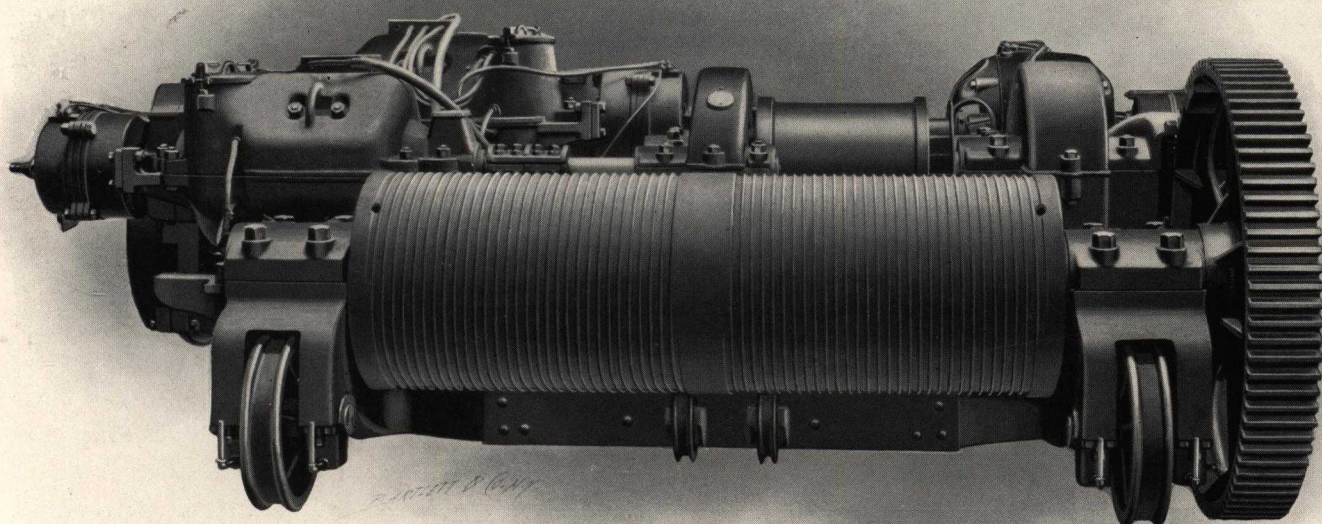
NILES CRANE TROLLEYS

On the opposite page are shown two illustrations of our standard 30-ton trolley with 5-ton auxiliary hoist. The trolley is so arranged that any standard type of motor can be used. All gears are steel and all pinions are steel forgings. The shafts are held in position by cap bearings arranged to permit the removal of any shaft without interfering with any other shaft.



STANDARD 30-TON TROLLEY

Showing 5-ton auxiliary hoist equipped with load brake and electric brake the same as the main hoist. High-speed gears are encased and run in oil and dust-proof boxes



STANDARD 30-TON TROLLEY

Equipped with 5-ton auxiliary hoist, showing main hoist drum

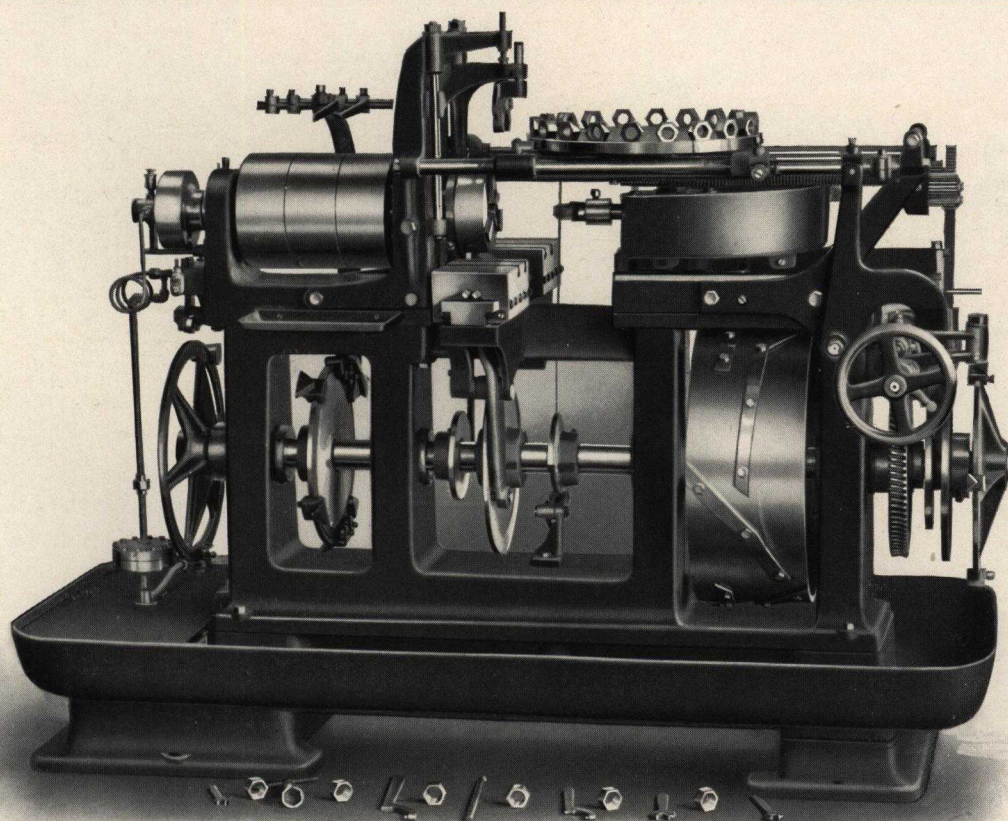


NILES 40-TON CRANE IN THE PALACE OF MACHINERY

NILES 40-TON ELECTRIC TRAVEL- ING CRANE

The above illustration shows our 40-ton crane, 80-foot span, installed over Machinery Hall. The girders are of box section built up from two web plates four angles and universal mill top and bottom cover plates. The web plates are reinforced by heavy stiffening angles and are connected at short intervals by diaphragms which prevent the girders from skewing diagonally when the crane is started suddenly. The bridge ends are built up of

heavy steel construction, and to prevent the girders from getting out of square, the bridge trucks are rigidly connected to the girders by heavy plates. The bridge driving motor is located about the center of the girder. The cross shaft is of sufficient strength to skid the truck wheels when the crane is fully loaded, thus insuring against any danger of distortion in the shaft due to sudden starting or careless handling. The bridge motor is supplied with a powerful foot brake which is connected directly to the armature shaft of the motor, and is operated by a foot lever in the cage.



AUTOMATIC SCREW MACHINE WITH DISK MAGAZINE

PRATT & WHITNEY AUTOMATIC SCREW MACHINE

WITH DISK MAGAZINE

In our new line of Automatic Screw Machines many of the movements are performed by compressed air, rendering the machines very rapid in operation. With the air-closing chuck in the machine illustrated, castings varying considerably in size can be handled successfully, so that the ordinary run of castings are used, doing away with the sorting of castings which is required by the older forms of magazine machines.

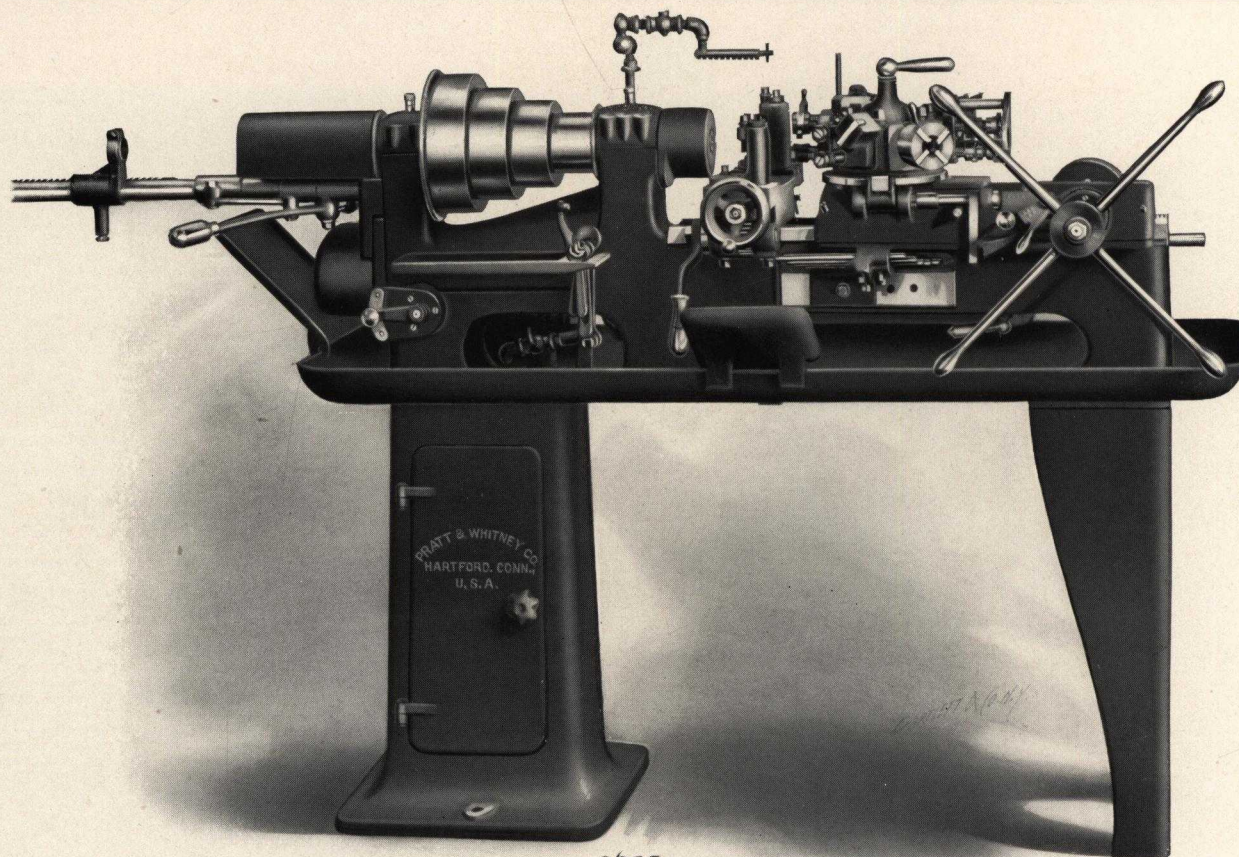
The machine illustrated is cammed for drilling and tapping brass nuts with 1-inch wrought-iron pipe thread. The operations comprise indexing of the horizontal magazine to bring a blank up to the transfer mechanism, the transferring of the blank to a position immediately in front of the chuck jaws, removing the blank from the transfer mechanism to the chuck (the latter coming automatically to a stop), closing the chuck jaws, tap drilling and chamfering for the tap, tapping, and ejecting the finished nut.

The whole series of operations is completed in twenty seconds, and is continuous so long as a supply of blanks is kept on the horizontal magazine properly distributed in the shallow recesses which mark their required locations.

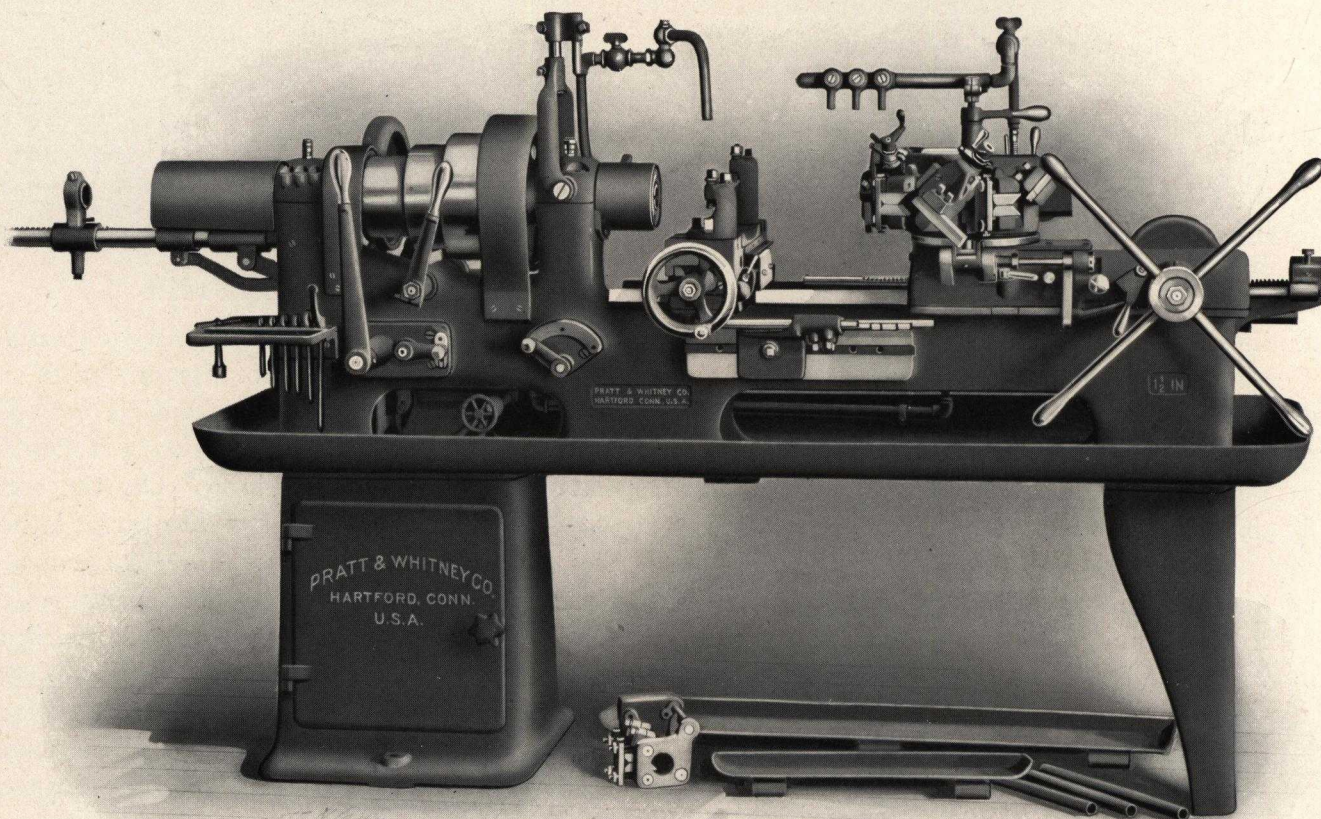
The machine can be easily adapted to handle almost any desired shape of blank.

TURRET LATHES

The Pratt & Whitney Company are exhibiting their complete line of turret lathes in five sizes, taking rod work from $\frac{5}{8}$ inch in diameter and $4\frac{1}{2}$ inches long to 3 inches in diameter and 36 inches long. On the next pages the four larger sizes of the turret lathes are illustrated. These machines have many points of advantage over other machines of this class. The double cross-slide permits work to be cut off while the turret tools are cutting. The separate stops for each tool in the turret are very easy to adjust. The power rod feed is of simple construction, does not mar the rod and handles squares and hexagons as well as rounds.

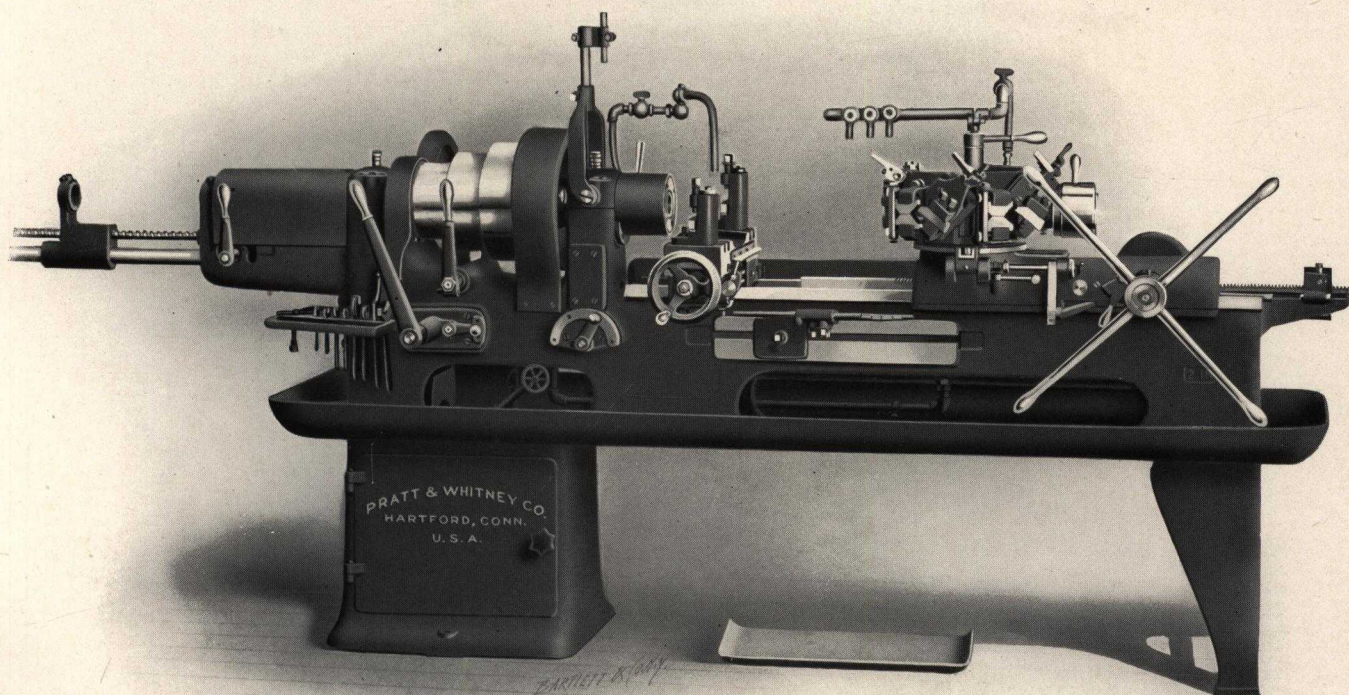


1 X 10-INCH TURRET LATHE

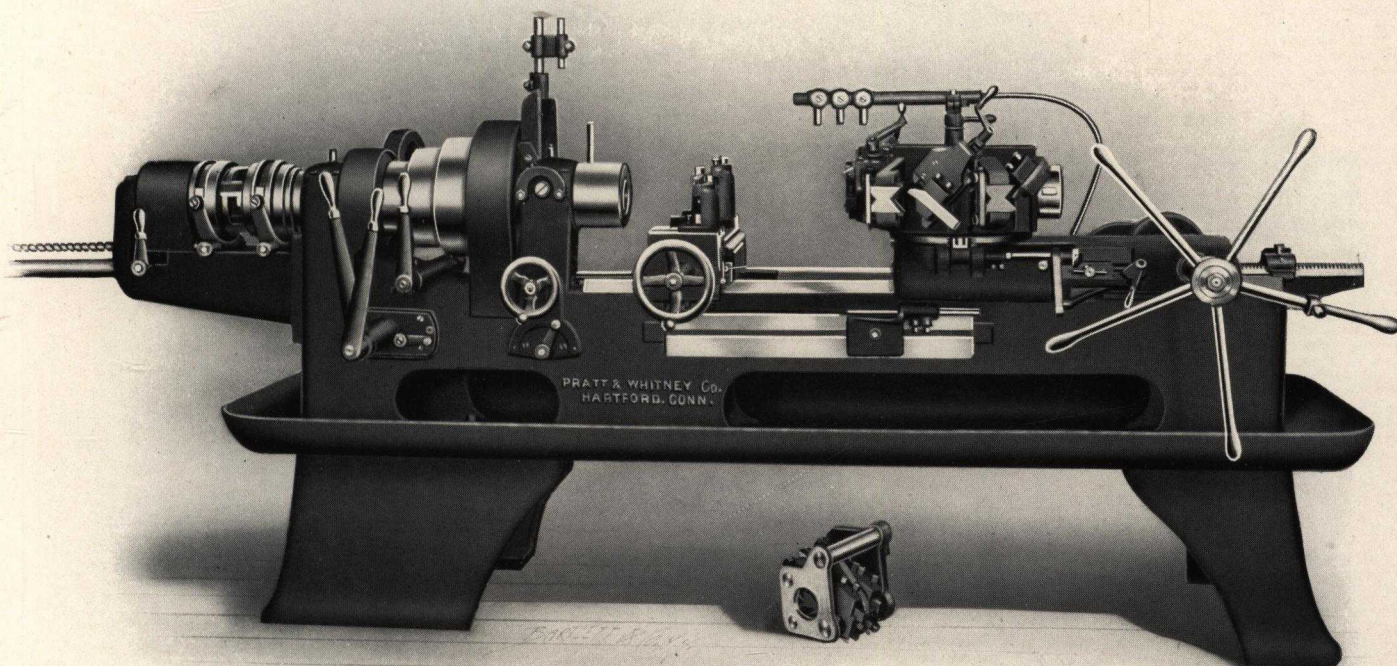


1 1/2 X 18-INCH TURRET LATHE

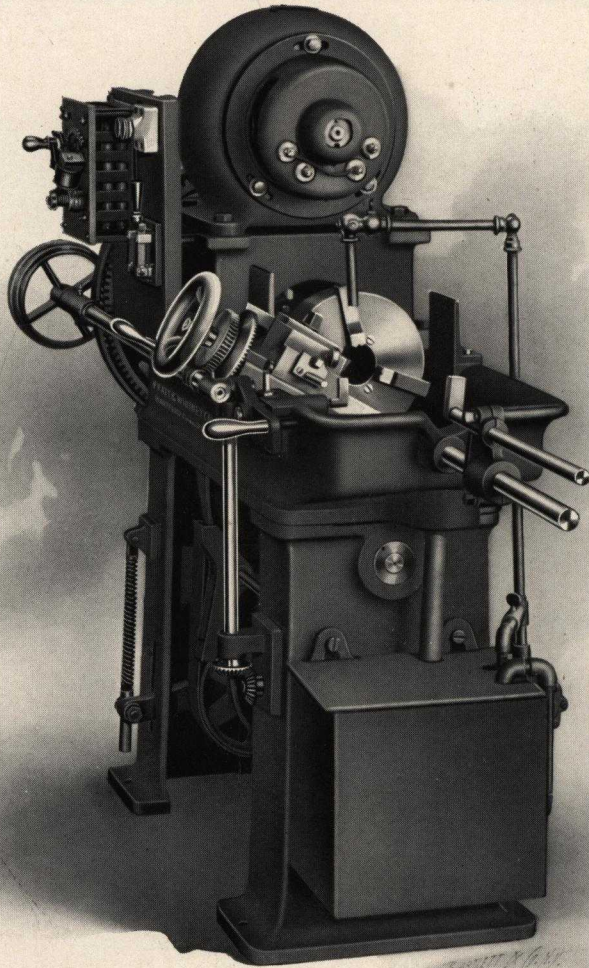
THE PROGRESS REPORTER



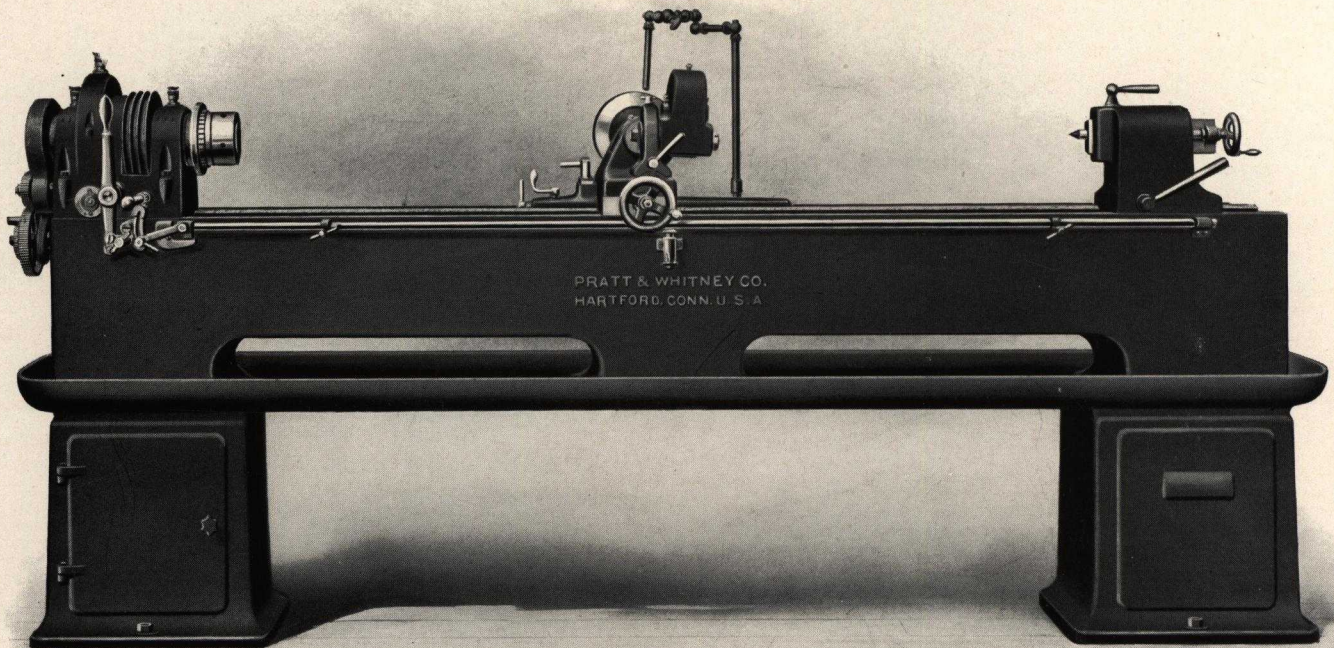
2 X 26-INCH TURRET LATHE



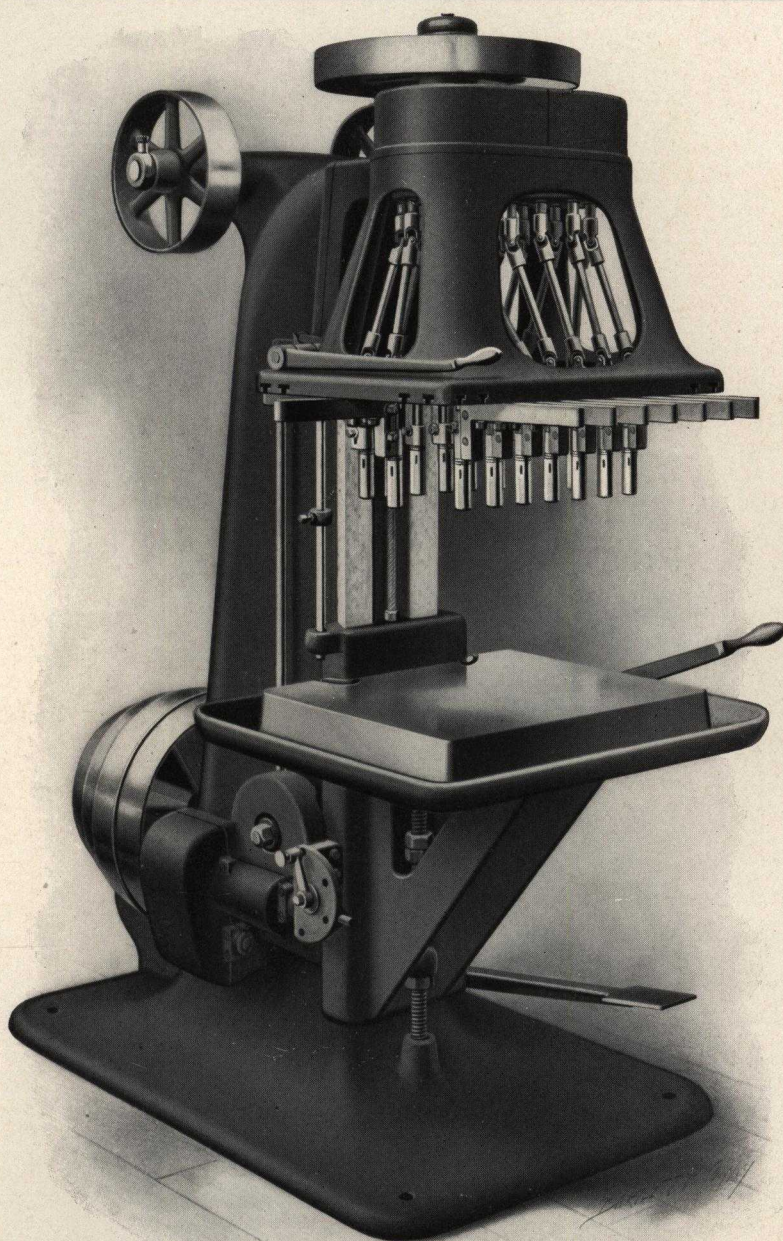
3 X 36-INCH TURRET LATHE



CUTTING-OFF MACHINE WITH INCREASE SPEED MECHANISM



6 X 80-INCH THREAD MILLING MACHINE



NO. 13 ADJUSTABLE MULTI-SPINDLE DRILL

No. 13 ADJUSTABLE MULTI-SPINDLE DRILL

This drill is designed for drilling 16 holes simultaneously up to $\frac{1}{2}$ inch in diameter. The spindles are all adjustable, permitting groups of holes to be drilled of any shape or size.

THREAD MILLING MACHINES

The Thread Milling Machine is now replacing the lathe for all threading work in shops, and is producing work more accurately, with better finish and cheaper than is possible

with the lathe. The machine illustrated is designed for threading work up to 6 inches in diameter and is built with various lengths of bed, taking work up to 132 inches long. We also build a machine for work up to 12 inches in diameter of various lengths.

CUTTING-OFF MACHINE

WITH INCREASED SPEED MECHANISM
MOTOR-DRIVEN

This machine is designed for cutting off stock from 1 to $4\frac{1}{2}$ inches in diameter.

THE PROGRESS REPORTER



SMALL TOOL DEPARTMENT
PRATT & WHITNEY CO.
 HARTFORD, CONNECTICUT

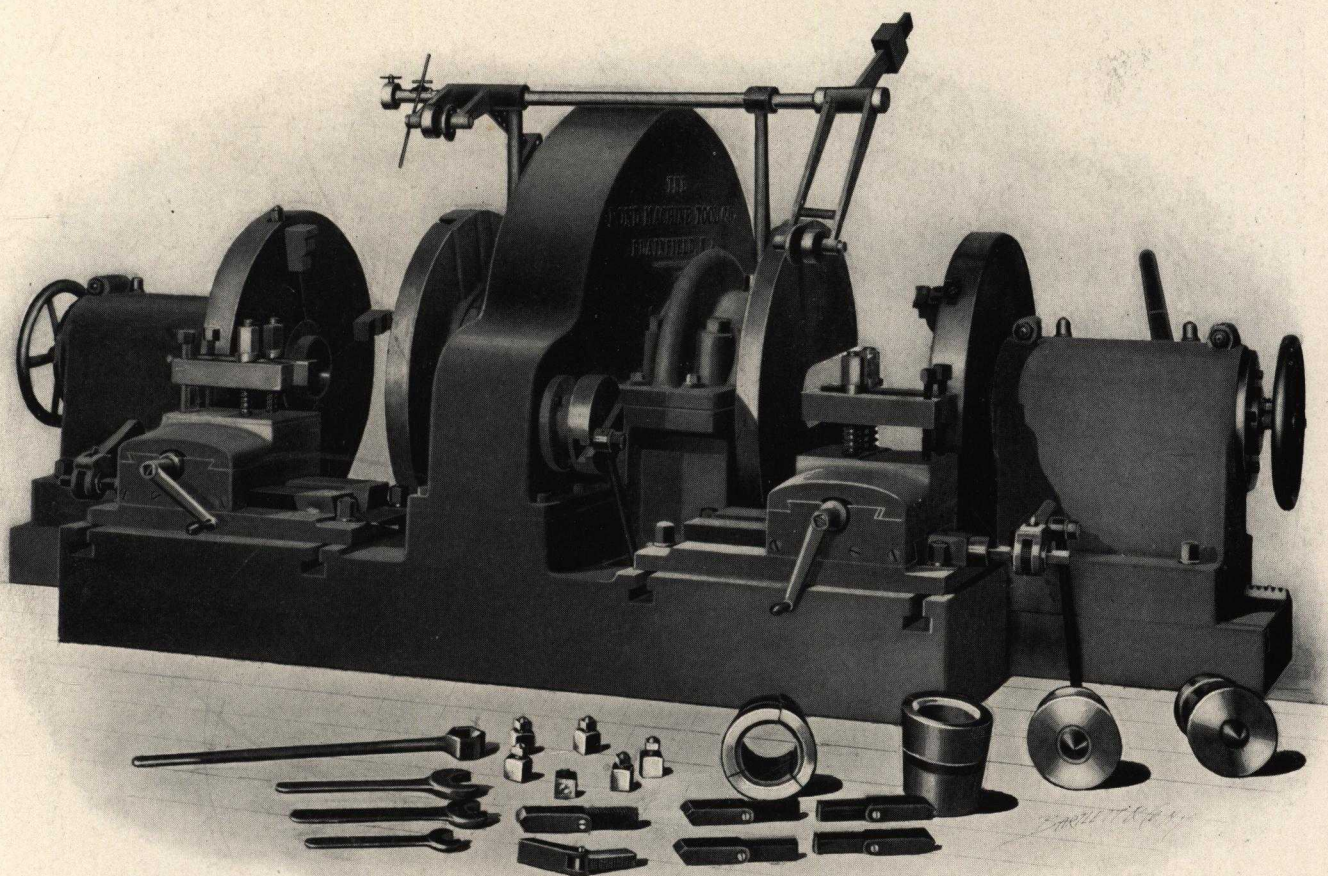
PROGRESS REPORTER



NILES - BEMENT-POND CO.
136-138 LIBERTY ST., NEW YORK.

SEPTEMBER, 1904

No. 4



415

LATEST POND STEEL-TIRED CAR-WHEEL LATHE AND EQUIPMENT

T H E P R O G R E S S R E P O R T E R

PROGRESS REPORTER

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NILES-BEMENT-POND COMPANY, NEW YORK

LONDON, 23-25 VICTORIA STREET, S. W.

SEPTEMBER, 1904

No. 4

THE PROGRESS REPORTER will be issued by the Niles-Bement-Pond Company every few weeks as interesting new matter accumulates.

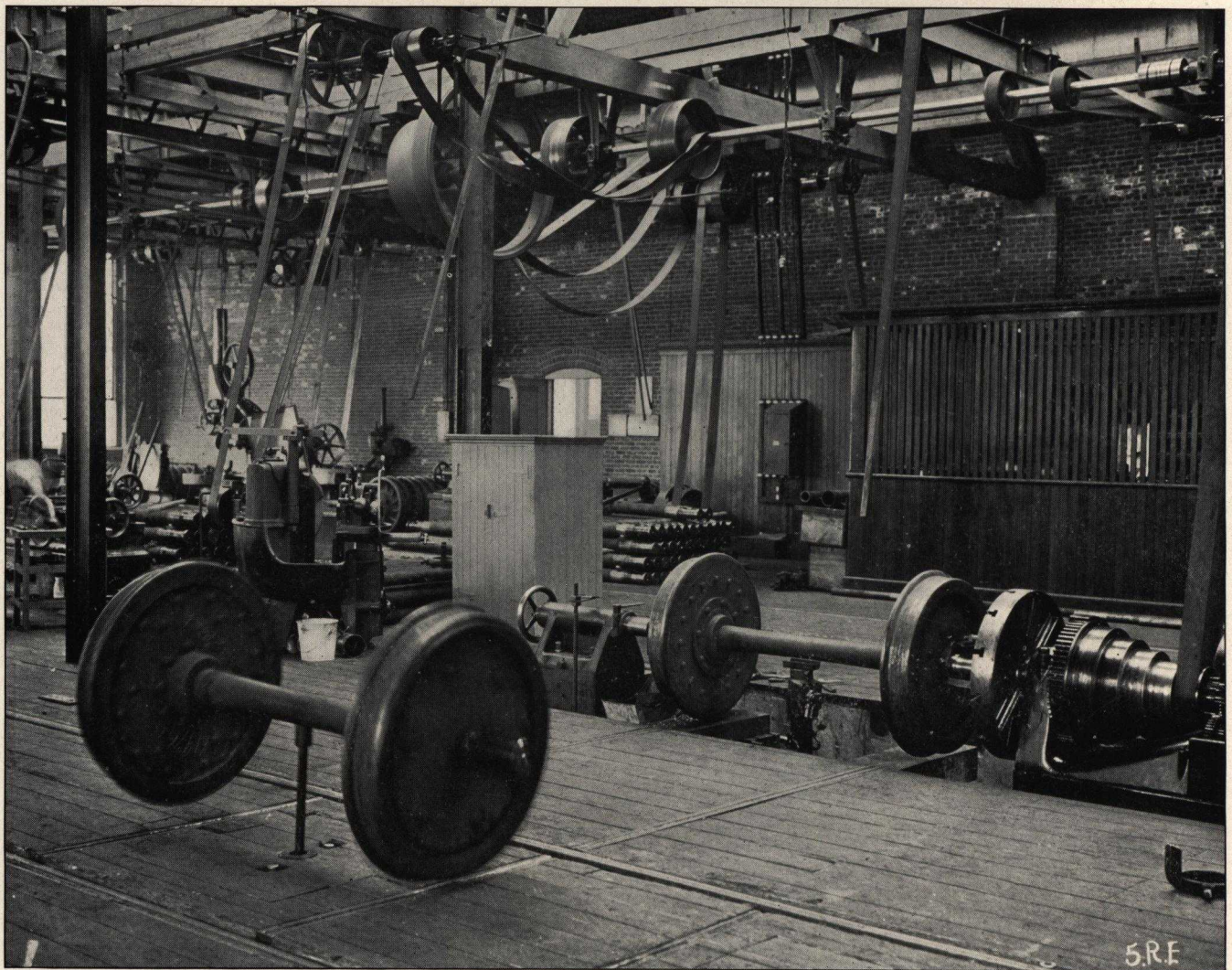
The object of the publication is to keep the employes of the company and the public generally, informed as to the new machines and devices which are constantly being brought out.

IMPROVED POND CAR WHEEL LATHE

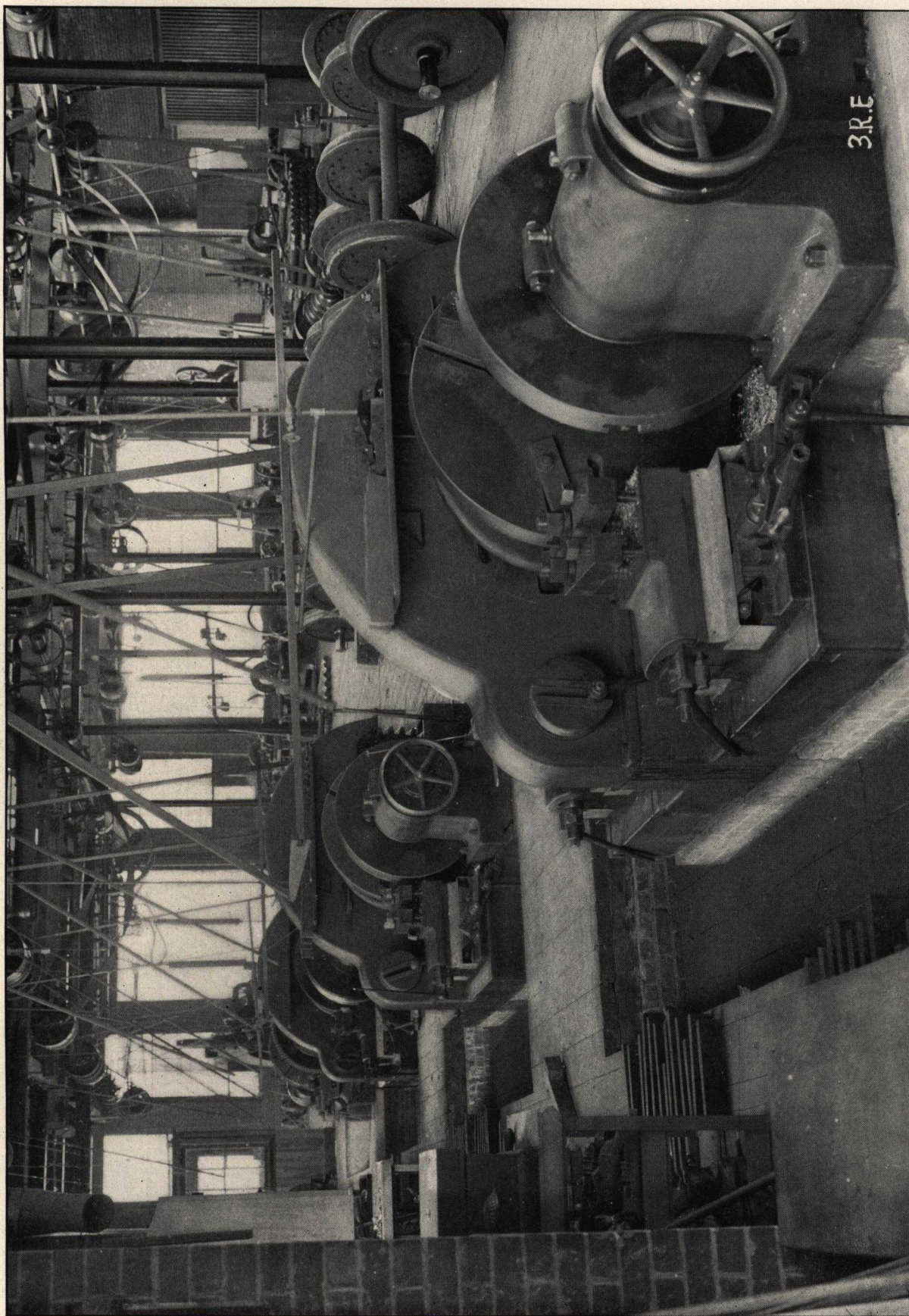
With a good quality of high power steel tools we are now able to turn from five to seven pairs of 42-inch wheels in ten hours, or an average of thirty-six pairs a week.

This high rate of production has been brought about by improvements in the lathe and its equipment, and in appliances for handling the wheels to and from the machine.

In this issue of the PROGRESS REPORTER we show a number of photographs of the Car Wheel Lathe in operation with proper equipment, and on page 4 is a short article giving in detail the method of operation we recommend for attaining the highest rate of production.



VIEW SHOWING POND JOURNAL TURNING LATHE AND AIR LIFT OPERATED BY FOOT VALVES IN THE FLOOR FOR QUICKLY HANDLING WHEELS TO RIGHT ANGLE TRACK



THREE POND STEEL-TIRED CAR-WHEEL LATHES

THIS VIEW SHOWS THE PITS IN FRONT OF THE LATHES FOR THE CONVENIENCE OF THE OPERATORS

TURNING STEEL-TIRED CAR- WHEELS AT THE AVERAGE RATE OF SIX PAIR IN TEN HOURS

The Pond Steel-tired Car-wheel Lathes with the new special equipment which makes it possible for each lathe to turn out 36 pairs of wheels a week, are shown clearly in the illustrations.

The lathes are set level with the floor so that wheels can be easily rolled in, and are provided with pits in front for the convenience of the operators. Tracks consisting of $\frac{5}{8}$ x 2-inch bar iron planed with a groove for the wheel flanges lead to each lathe. The wheels are rolled in on the longitudinal track and at the junctions of this track with each of the various tracks leading to the machines, air lifts, operated by foot valves in the floor, are provided, which enable the wheels to be quickly transferred from one track to another. In rolling the wheels into the lathes, the tracks save much time as the wheels are rolled in absolutely central.

The wheels first go to the journal lathe, if the journals need truing, and then to the car-wheel lathes. In putting a pair of wheels in the car-wheel lathe, first the bushings are put on the journals, then the wheels are rolled in, and the tailstocks brought up. The adjustment of the new "Sure Grip" driver is the next step, and to the use of this patented driver a large part of the increase in production is due. The chuck-jaws in the face plates hold the tires rigidly and by screwing up the set screws of the "Sure-Grip" driver, the tires are firmly wedged between the driving-plates and the chuck-jaws so that the full power of the machine can be utilized.

The self-hardening steel used for the tools is 3 x $1\frac{1}{4}$ inches which is large enough to prevent springing or breaking, and the large cross section also has the advantage of carrying away

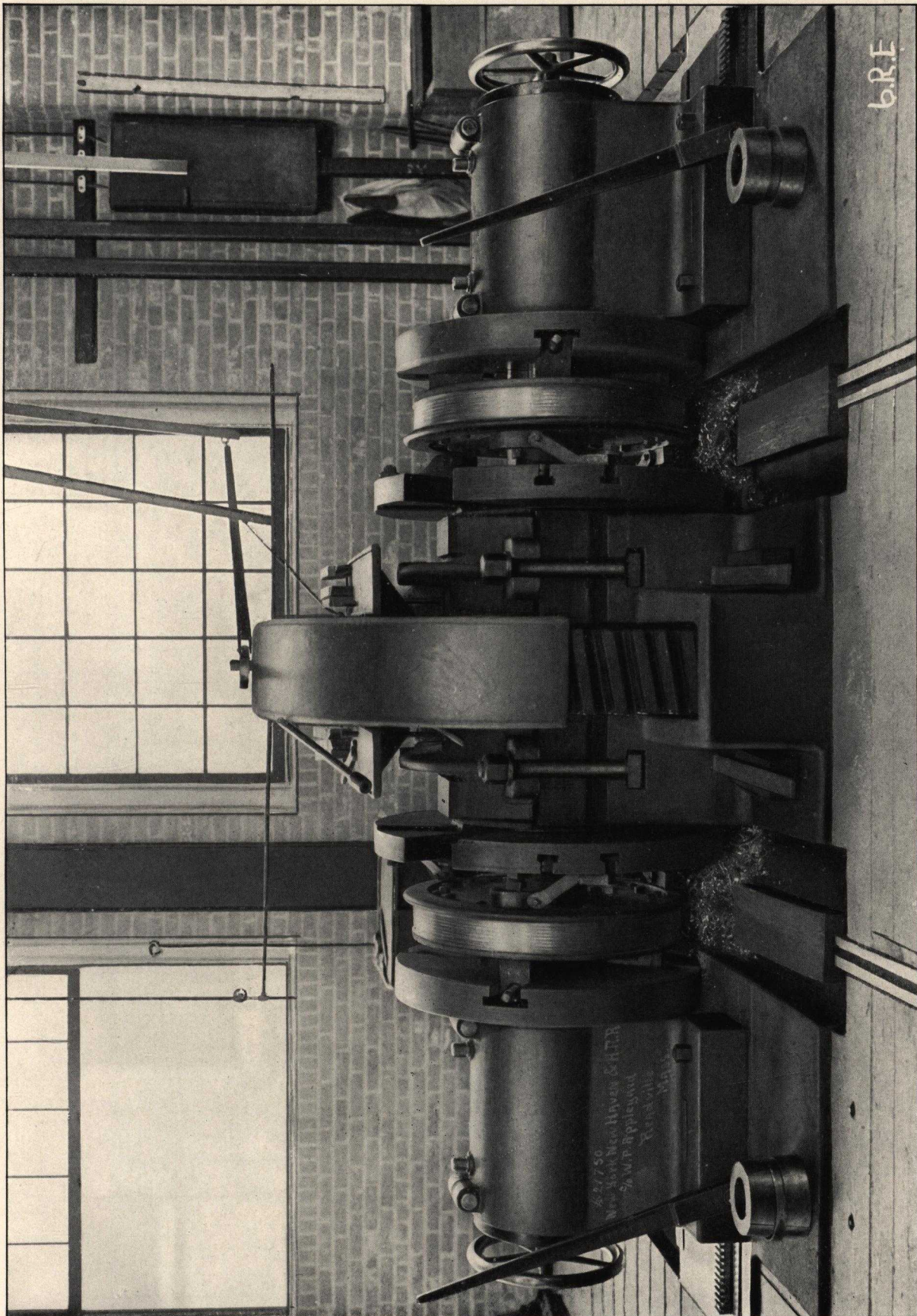
rapidly the heat generated at the cutting edge. Each lathe should be equipped with at least 6 right-hand and 6 left-hand roughing tools to provide for grinding, dressing, etc.; 2 right-hand and 2 left-hand of each kind of flange tool, 2 sets of scraper blades and 24 cold chisels of $1\frac{1}{4}$ -inch steel dressed narrow and blunt, and a five pound hammer to take out chilled spots. The drawing on page 7 shows the various tools.

The cut on the tread should be started next to the flange, using the round-nose roughing tool with $\frac{3}{8}$ to $\frac{1}{2}$ -inch feed or whatever the tool will stand. This operation takes from 24 to 45 minutes. The outer edge of the tire should next be rounded and the scraper applied to the tread, which is smoothed up in one or two revolutions of the lathe. This consumes 5 or 6 minutes and the tread is finished.

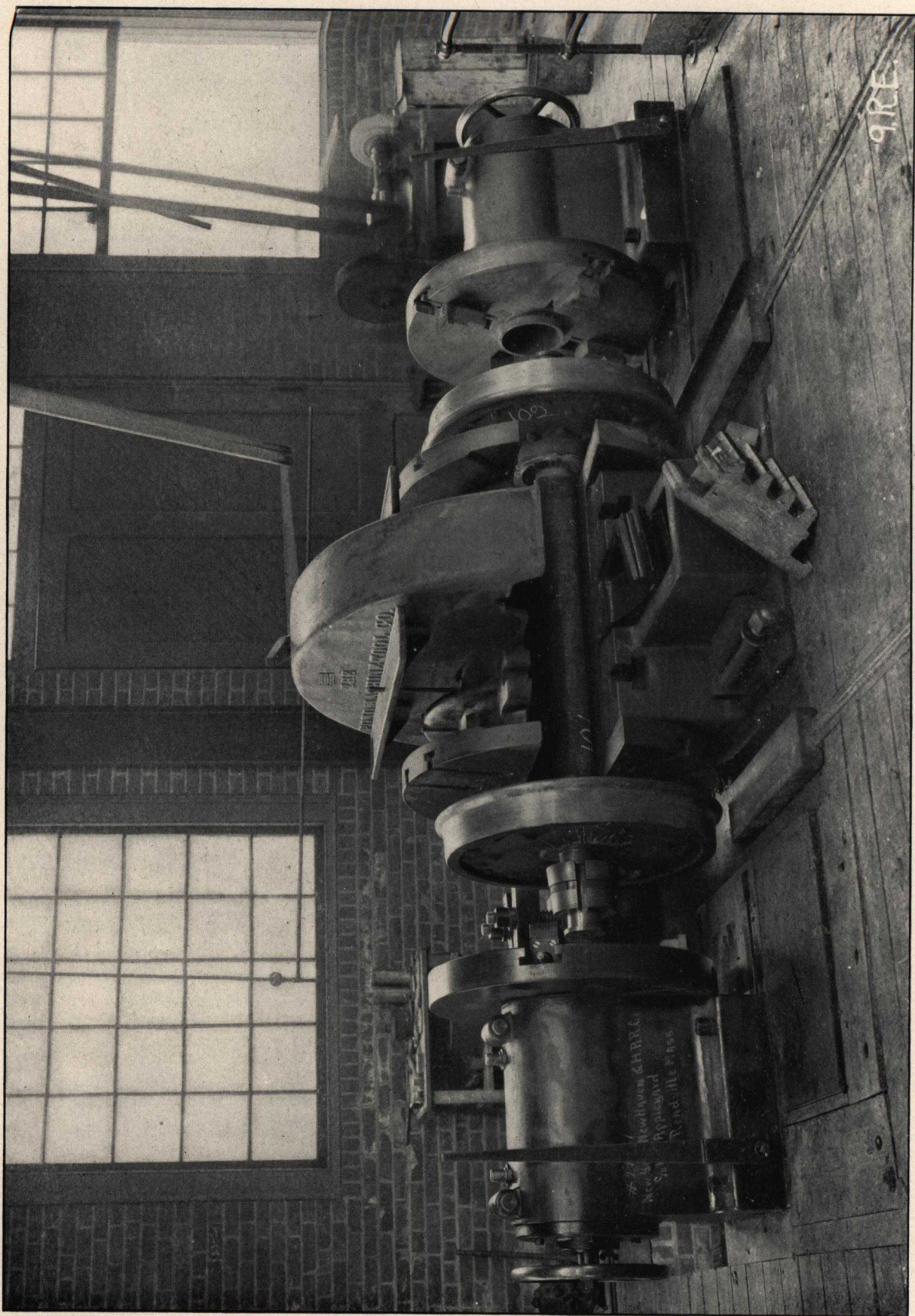
Then the top of flange is cut down to proper height, using the flat-nose tool. The outside of the flange is roughed to something near shape with the round-nose tool and it is reduced if too thick. It is finished with the flange tool which is the exact shape of one-half of the flange. Next the back of flange is roughed as before and is finished with the other flange tool. The flange tools should be kept in shape by grinding on the top.

It has been found that the output of the lathes is the greatest when the feed and depth of cut are at maximum, rather than when a high speed is used. The usual speed is from 6 to 10 feet per minute or whatever the tool will stand.

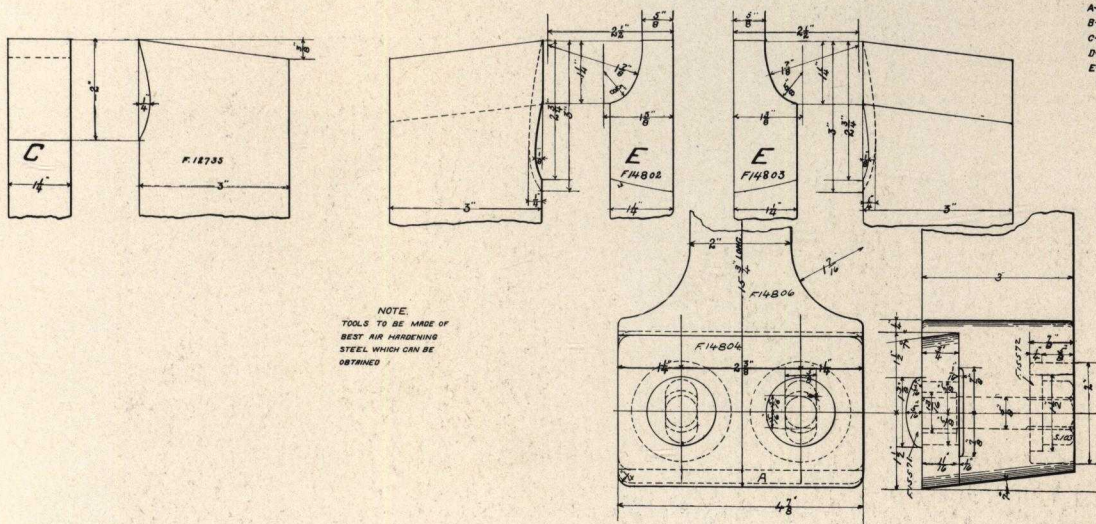
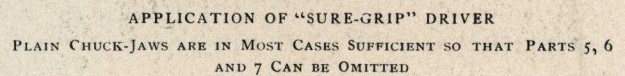
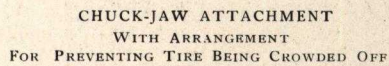
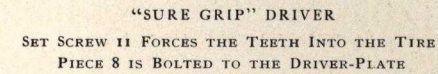
The actual time of taking out a pair of wheels and putting in another pair should not consume more than 8 to 12 minutes with wheels convenient to the lathe. Lathes with the equipment just described with an experienced operator should turn from 5 to 7 pairs in ten hours or an average of 36 pairs a week. Wheels have been turned, however, in less than 45 minutes.



TURNING CAR-WHEELS AT THE RATE OF SIX PAIR IN TEN HOURS
VIEW SHOWING PAIR OF WHEELS HELD IN LATHE WITH APPLICATION OF "SURE GRIP" DRIVER



VIEW SHOWING PAIR OF WHEELS ABOUT TO BE ROLLED OUT OF THE LATHE
LATHE IS SET LEVEL WITH THE FLOOR AND IS PROVIDED WITH TRACKS SO THAT WHEELS CAN BE
EASILY ROLLED IN EXACTLY CENTRAL

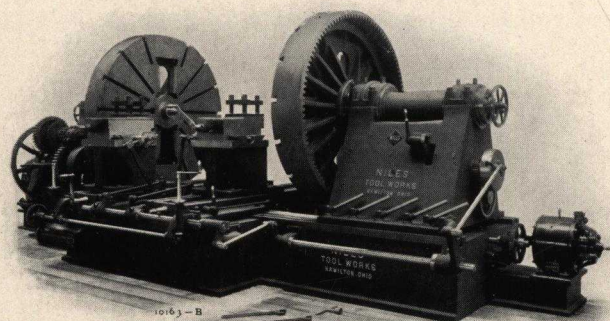


A-SCRAPING TOOL FOR TREAD, F. 14804:
B-ROUGHING TOOLS; RIGHT & LEFT.
C-FOR TOP OF FLANGE
D-INSIDE FLANGE TOOL RIGHT & LEFT.
E-OUTSIDE FLANGE TOOL RIGHT & LEFT.
TOOL STOCK F14806

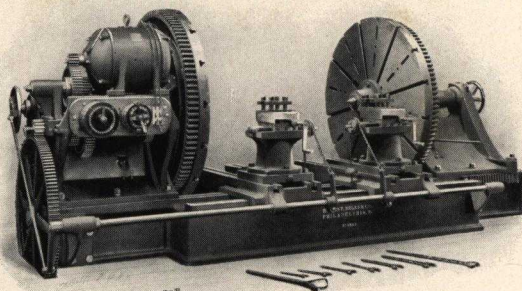
NOTE.
TOOLS TO BE MADE OF
BEST AIR HARDENING
STEEL WHICH CAN BE
OBTAINED

THE POND MACHINE TOOL CO
PLAINFIELD, N.J.
MACHINE: 42" STEEL TIRE LATHE.
PARTS. TOOLS.
SCALE. FULL SIZE.
Dwg. DATE
TRD. ELL. DATE NOV. 2, 1903.
CHD. MALL DATE - 6 -

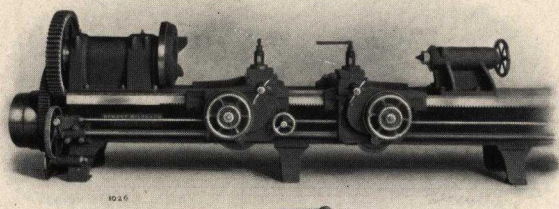
TOOLS USED IN TURNING STEEL-TIRED CAR-WHEELS



80-INCH NEW MODEL DRIVING WHEEL LATHE

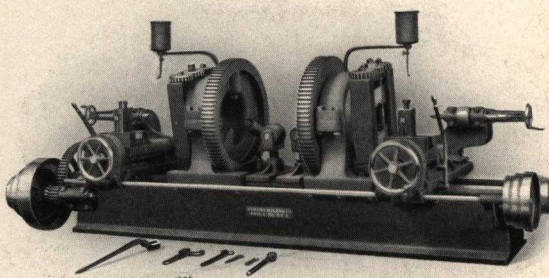


79-INCH DRIVING WHEEL LATHE, MOTOR DRIVEN

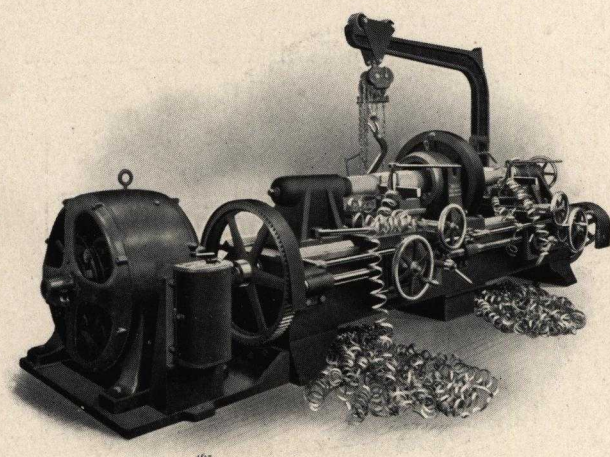


EXTRA HEAVY SINGLE AXLE LATHE

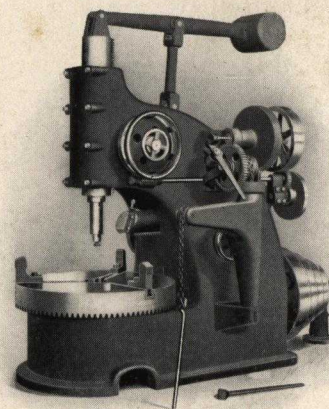
NILES Railway Machinery



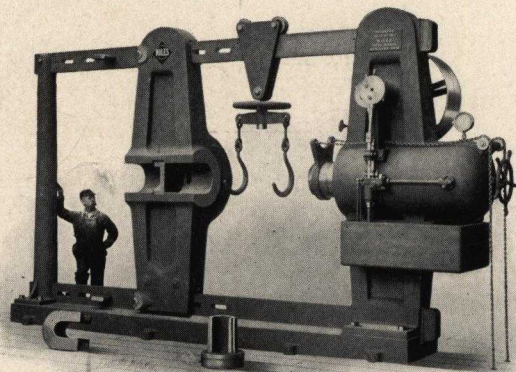
DOUBLE CUTTING-OFF AND CENTERING MACHINE



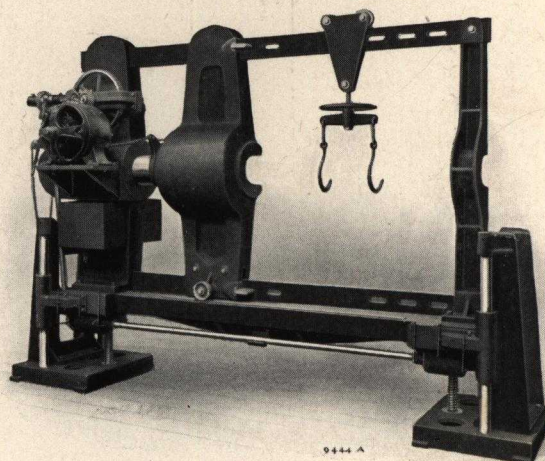
EXTRA HEAVY DOUBLE AXLE LATHE, MOTOR DRIVEN



42-INCH CAR-WHEEL BORER



96-INCH HYDRAULIC WHEEL PRESS



96-INCH HYDRAULIC WHEEL PRESS, WITH ELEVATING MECHANISM

PROGRESS REPORTER



NILES - BEMENT-POND CO.
136-138 LIBERTY ST., NEW YORK.

AUGUST, 1904

SPECIAL NUMBER



W-A-21

WATERVLiet ARSENAL

P R O G R E S S R E P O R T E R

COPYRIGHTED, 1904, BY
NILES-BEMENT-POND COMPANY, NEW YORK
LONDON, 23-25 VICTORIA ST., S. W.

AUGUST, 1904

SPECIAL NUMBER

THE PROGRESS REPORTER will be issued by the Niles-Bement-Pond Company every few weeks as interesting new matter accumulates.

The object of the publication is to keep the employés of the company, and the public generally, informed as to the new machines and devices which are constantly being brought out.

WATERVLIIET ARSENAL

We illustrate in this number of the "Progress Reporter" the equipment of the United States gun factory at West Troy, N. Y. The machinery in this plant was furnished by the Niles-Bement-Pond Company.

This arsenal, known as "Watervliet," is the principal gun factory of the United States Army. In this plant have been built our coast defense guns up to 16 inches bore. The equipment is recognized by experts as the finest in the world at the present time. We feel, therefore, much pride in publishing these illustrations of the various machines showing the leading operations in ordnance manufacture.

In addition to the plant here illustrated, we have furnished most of the equipment of the United States Navy gun factory at Washington, D. C.; also the machinery for manufacturing gun carriages for the army at Watertown, Mass., and the gun-carriage department of the navy plant at Washington. We have also furnished ordnance machinery for the private plants of the Bethlehem Steel Works, Midvale Steel Works, and Carnegie Works at Pittsburg. We have shipped a large amount of ordnance machinery abroad, the particulars of which we are not at liberty to publish.

Much attention has been given to the subject of machinery used in the manufacture of armor plate, and we have furnished equipments for this purpose to the Carnegie Company, The Bethlehem Company, The Midvale Steel Company, and the Vickers Sons & Maxim Company of England.

Our Pratt & Whitney Works have for nearly forty years been the leaders in designing machinery for manufacturing small arms. The Pratt & Whitney Company were, in fact, the first to demonstrate the advantage and practicability of interchangeability in the parts of small arms, and machines of their design are now standard wherever small arms are made in quantities. Orders have been executed by the Pratt & Whitney Company for nearly every gun factory in the world, the orders ranging from a few machines to a million or more dollars' worth at one time.

Shortly after the Franco-Prussian war, Mr. Pratt was called to Berlin by the German Government, and he laid out, and the Company built and shipped, a very large plant for making small arms, the cost being over \$1,250,000, and upon this model all subsequent expansions have been based. Later machinery was furnished for what is now the Deutsche Waffen und Munitionsfabriken, where were made the famous Mauser rifles.

The Government small arms factory at Liege, Belgium, is equipped throughout by the Pratt & Whitney Company; the famous Enfield Arsenal of the English Government, near London, was also equipped by them, and since has been a model for Great Britain.

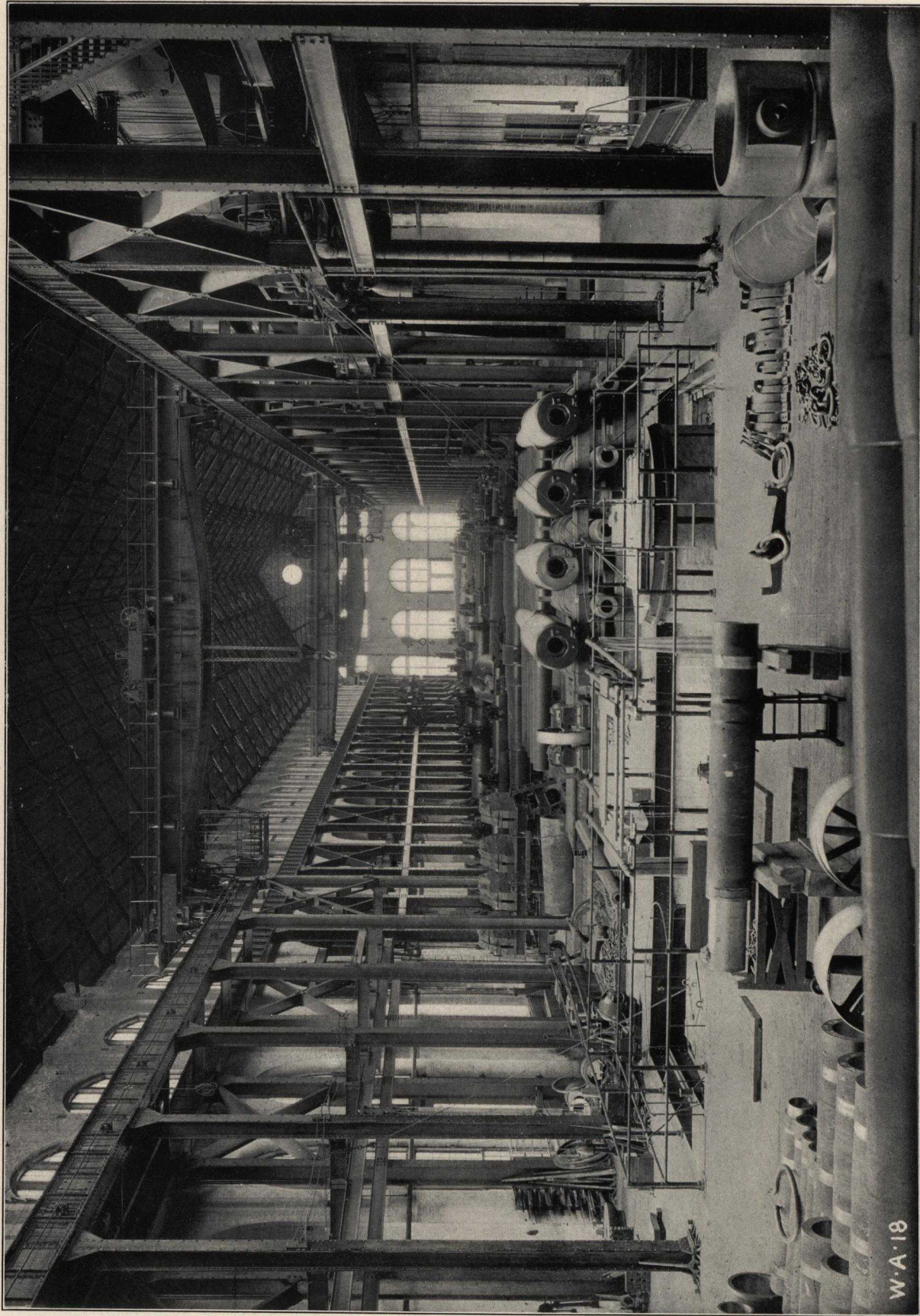
In the United States, the Government arsenals at Springfield and Rock Island are equipped by us, as well as many private factories, where small arms are made, throughout the country, such as Winchester, Remington, and many others.

A later edition of the "Progress Reporter" will be devoted to illustrations of some of our small arms factories, and a much fuller account of our achievements in this line will be given.



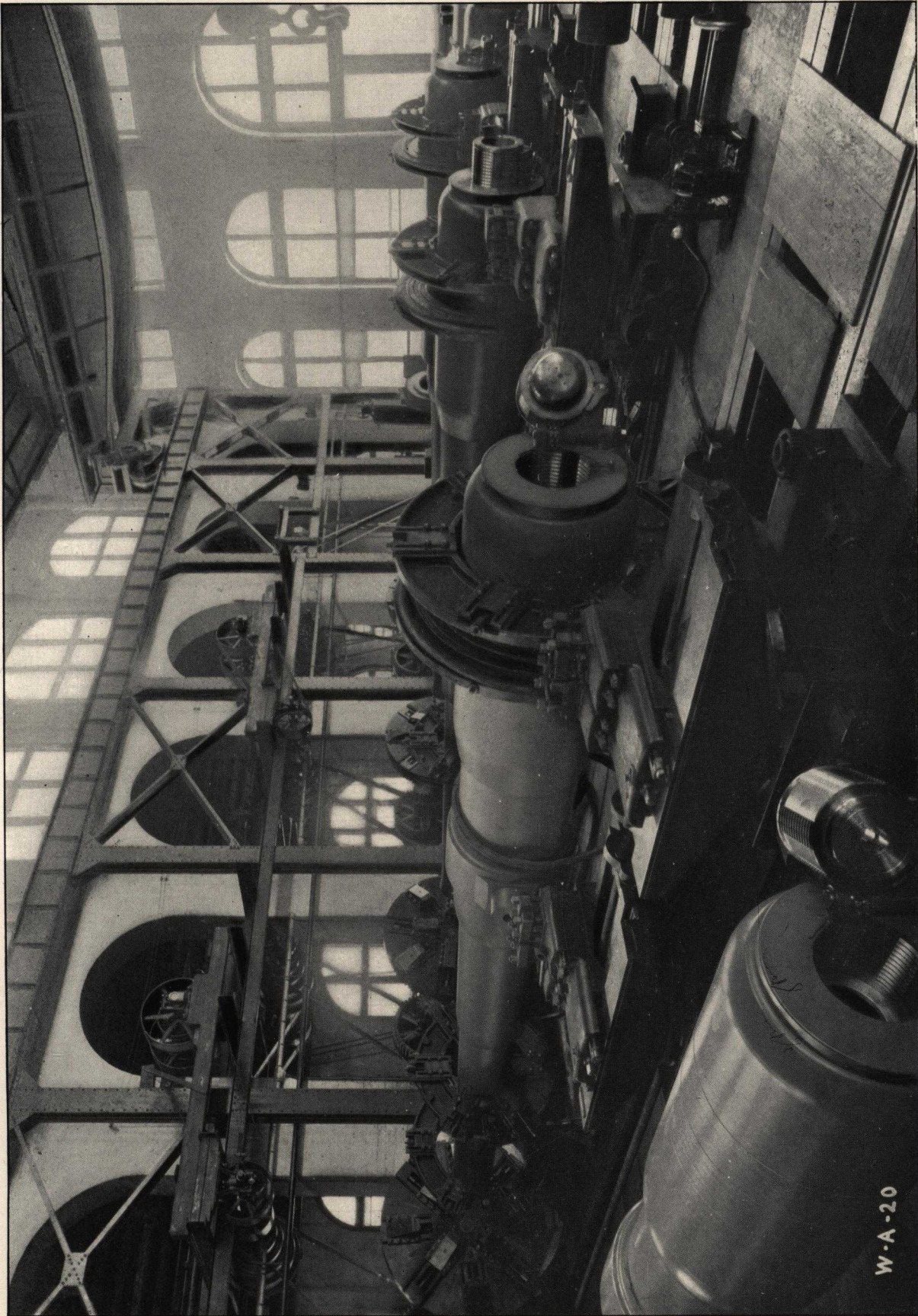
WATERVLIET ARSENAL

View looking north from center of shop. In the foreground there are five 96-inch Niles-Bement-Pond Gun Turning Lathes, and in the background there are eight 96-inch Niles-Bement-Pond Gun Boring Lathes



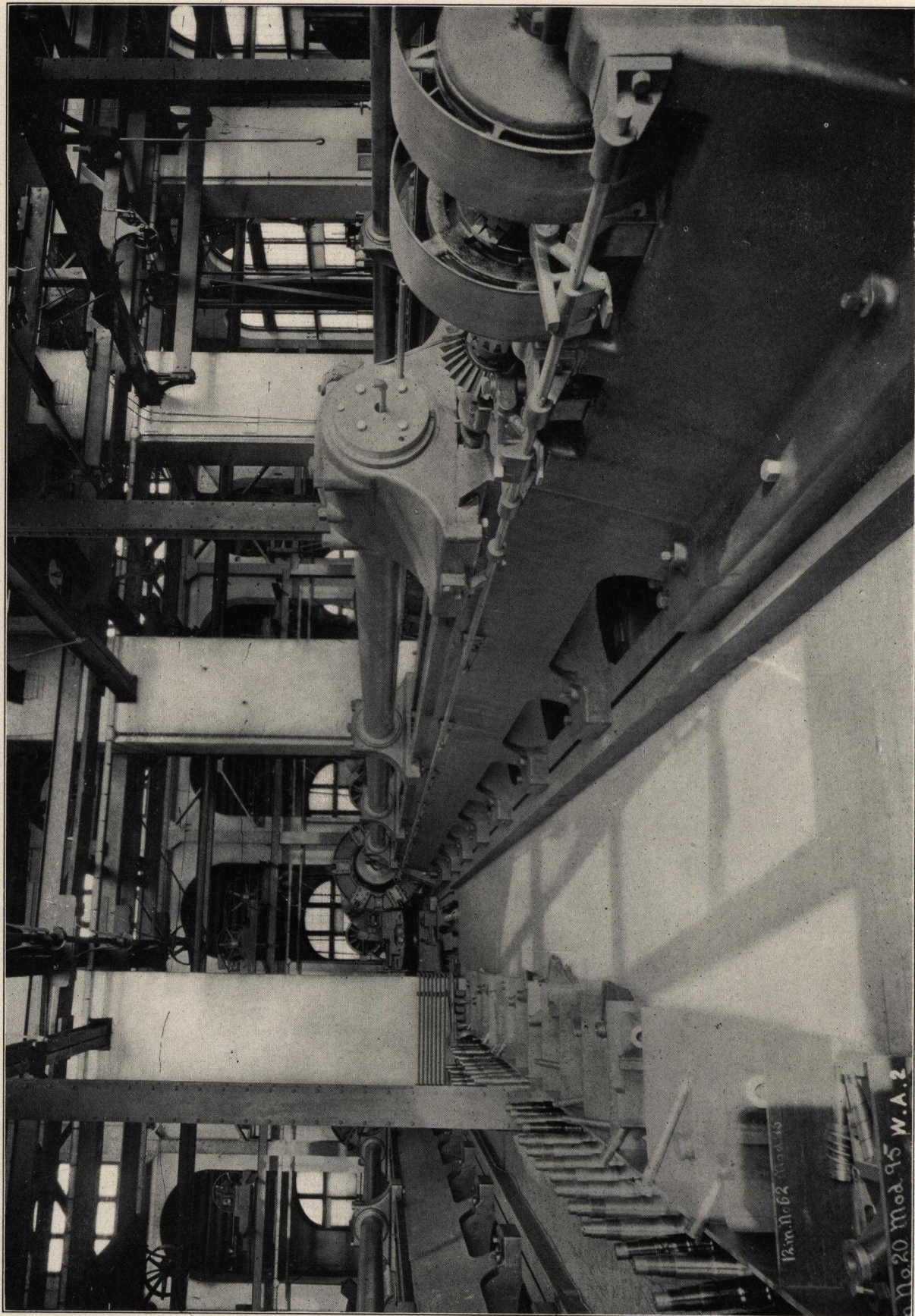
WATERVLIET ARSENAL

View looking from center of the shop towards the south end. The shrinkage pits are in the foreground. In this view are shown four 108-inch Gun Lathes, seven 96-inch Gun Boring Lathes and six 96-inch Gun Turning Lathes, all of which were built by the Niles-Bement-Pond Company. The extreme length of these lathes varies between 100 and 135 feet



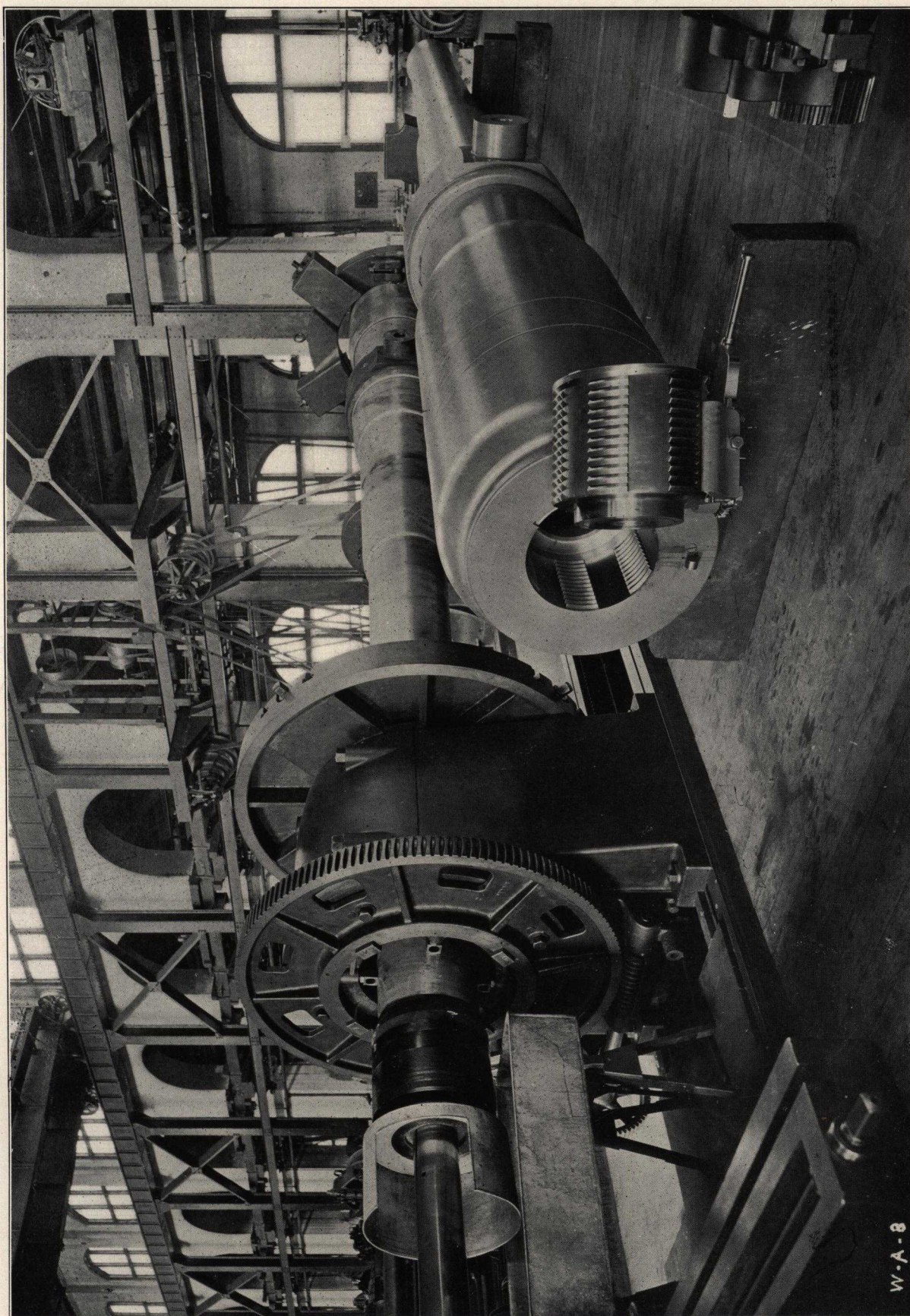
WATERVLIET ARSENAL

Group of four 108-inch Niles-Bement-Pond Gun Lathes at work on 12-inch rifles supported in steady rests. These lathes have face plates 108 inches in diameter. Bar travel, 50 feet. Carriage travel, 50 feet. Boring bars, 11 inches in diameter. Extreme length, 135 feet



WATERVLIET ARSENAL

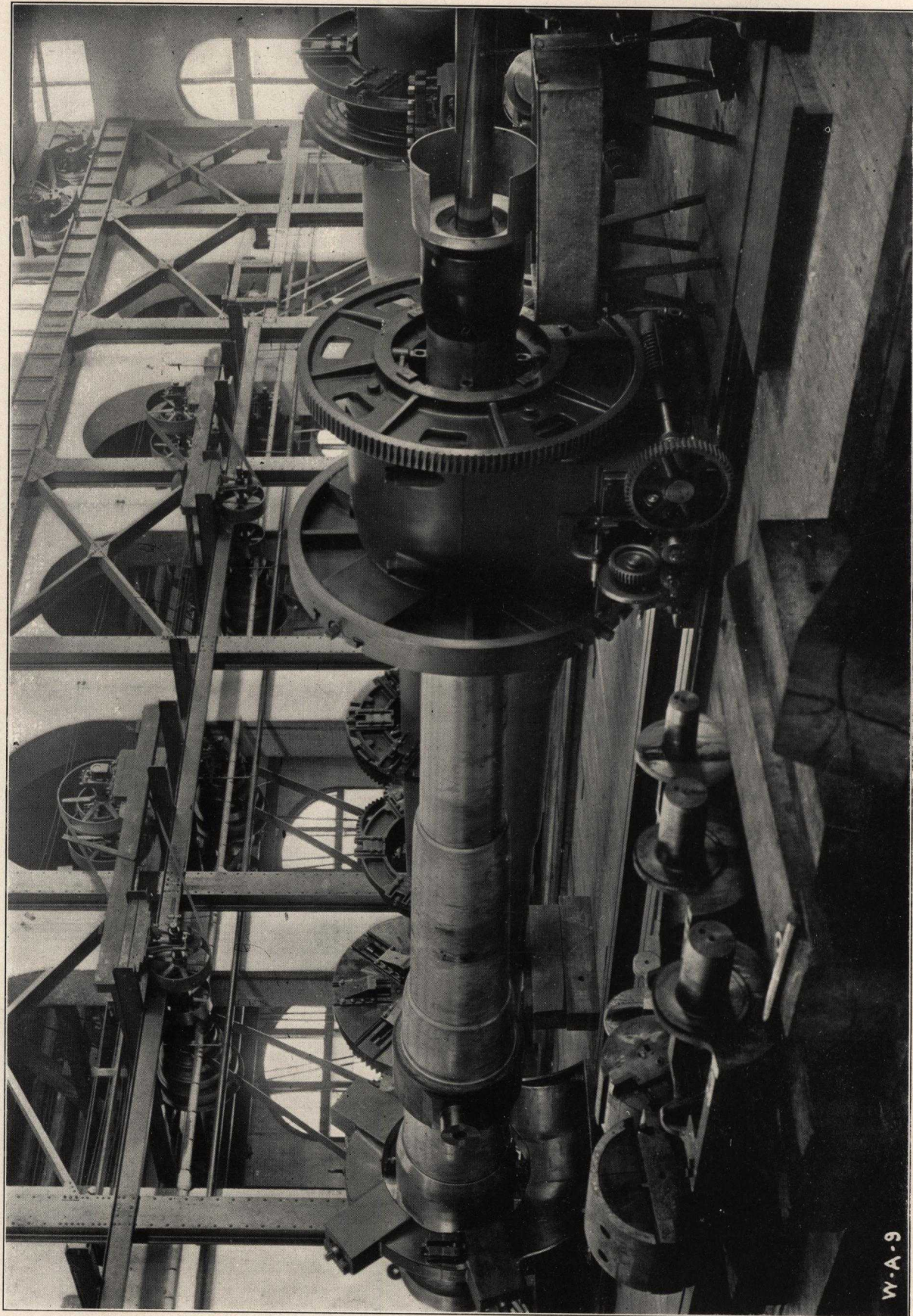
Rear View of 108-inch Niles-Bement-Pond Gun Lathe at work on a 12-inch 1900 model breech-loading rifle. This lathe was designed for boring and turning 16-inch caliber guns



W-A-8

WATERVLIET ARSENAL

Niles-Bement-Pond Rifling Lathe at work on a breech-loading 10-inch rifle. The rifling head carries 12 tools. In these rifles there are 60 grooves and 60 lands. The rifling bar has a traverse of 45 feet. A finished gun is shown on the floor in the foreground. Weight of rifle approximately, $34\frac{3}{8}$ tons



WATERVLIET ARSENAL

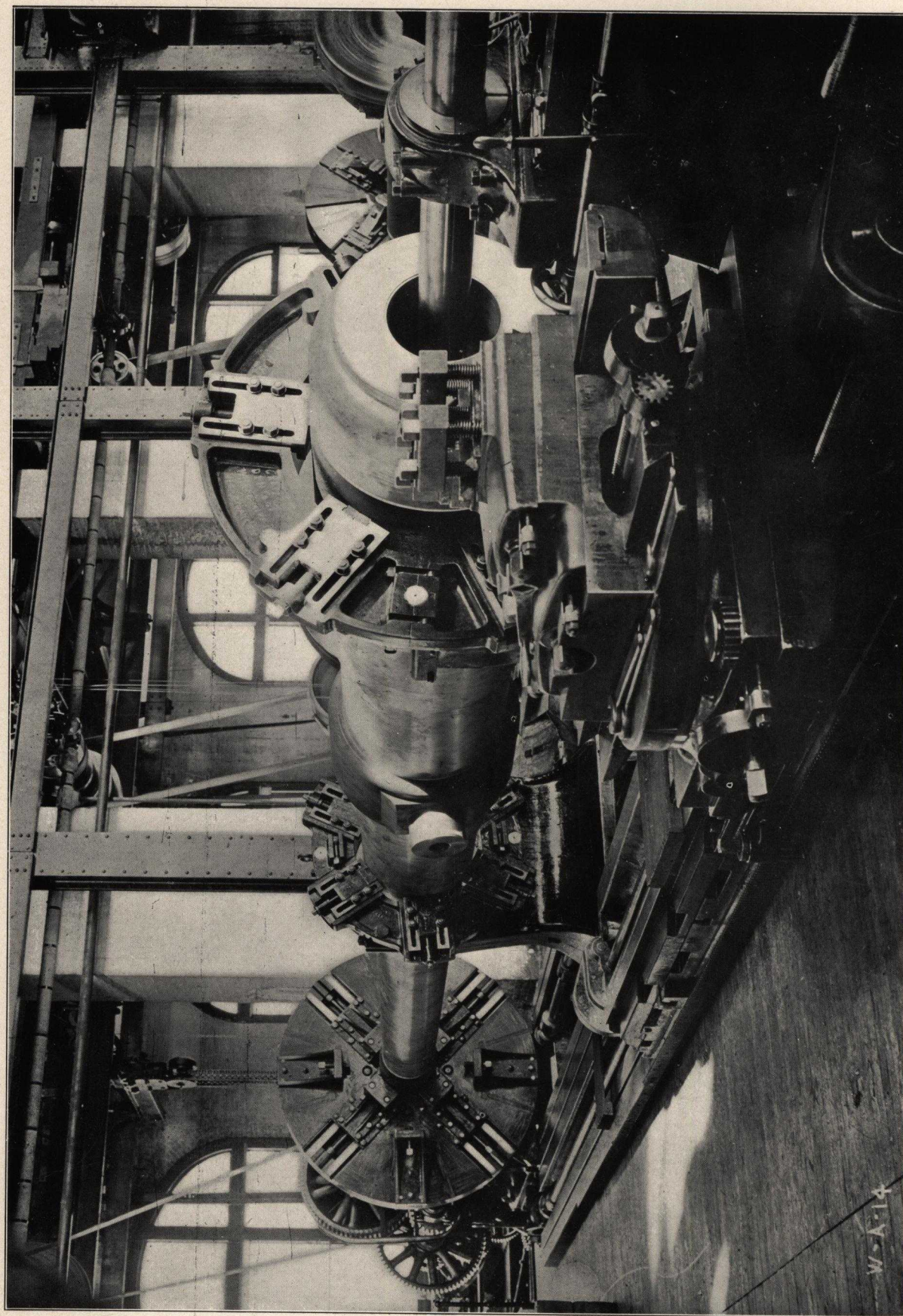
This is a view of the Niles-Bement-Pond Rifling Lathe shown in the preceding picture. It shows the muzzle end of the 10-inch rifle and the mechanism for obtaining the required twist. The rifle is about 35 feet long



W-A-22

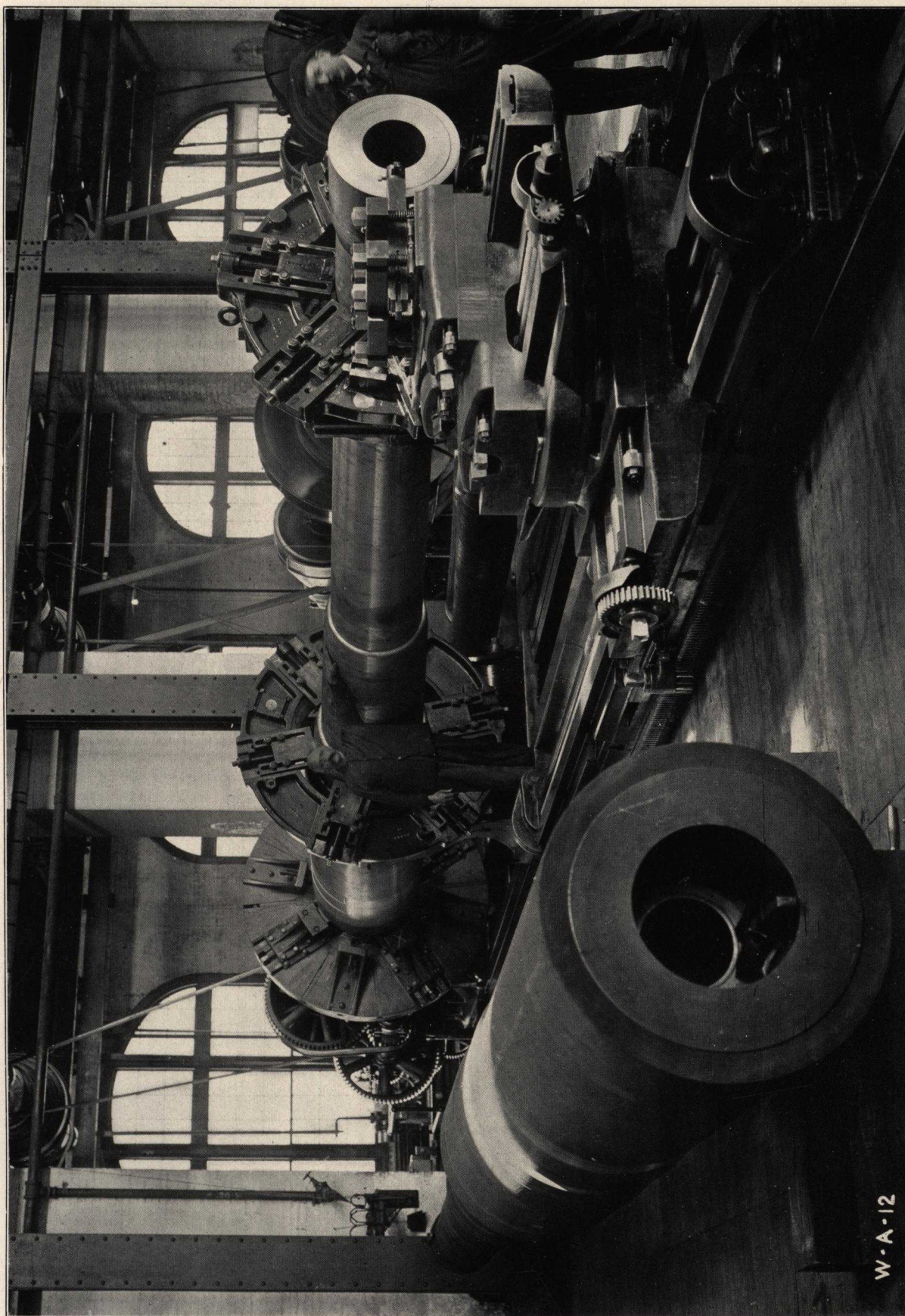
WATERVLIET ARSENAL

Row of thirteen 96-inch Niles-Bement-Pond Gun Lathes. The face plates of these machines are 8 feet in diameter. They take 40 feet between the centers and have a 40-foot carriage travel. The boring lathes have a bar travel of 36 feet



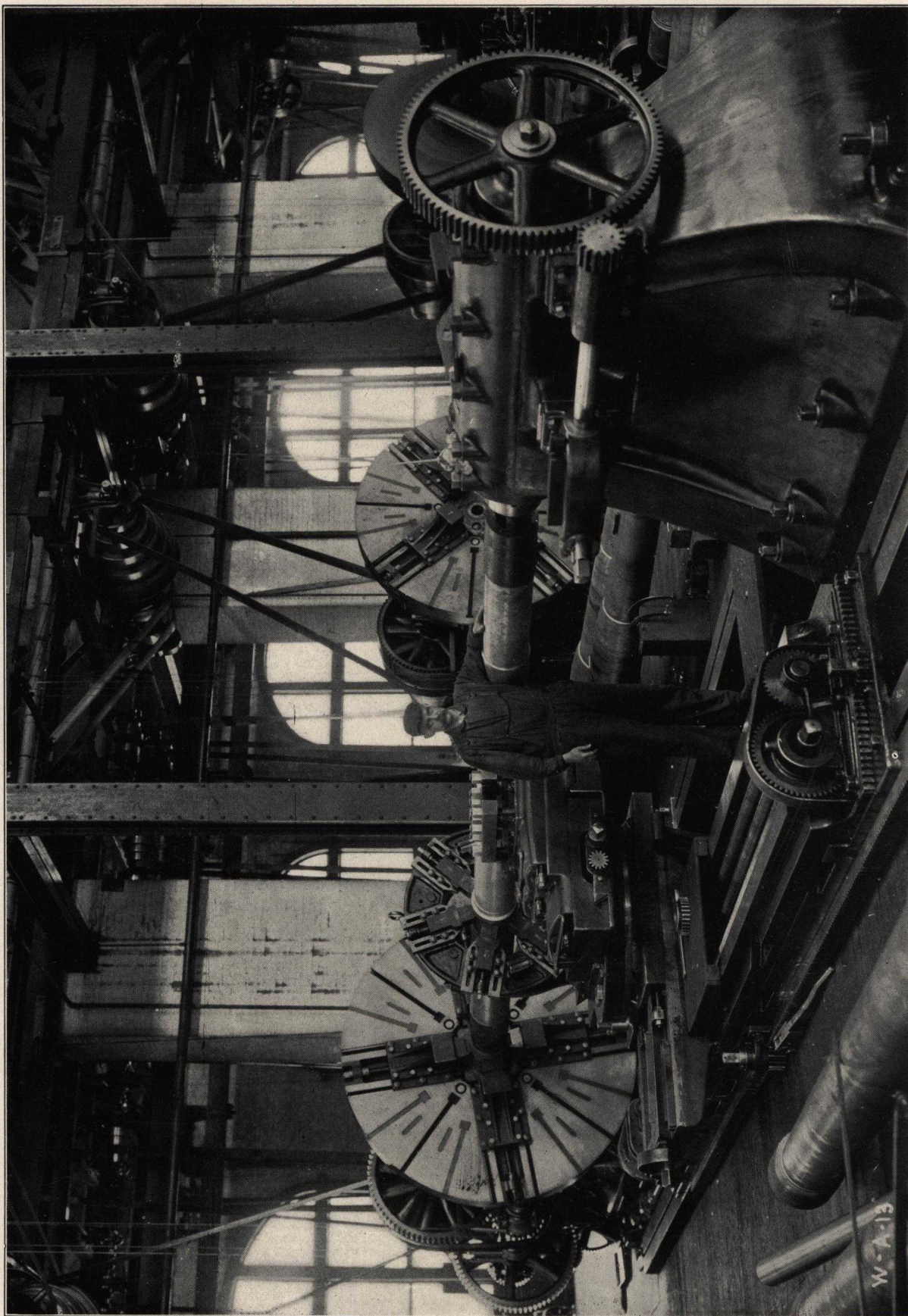
WATERVLiet ARSENAL

96-inch Niles-Bement-Pond Gun Lathe boring the powder chamber of a 10-inch breech-loading rifle. The boring bar has a 36-foot traverse. The gun is 21 inches in diameter at the muzzle, and 40- $\frac{1}{8}$ inches diameter at the breech, and approximately 35 feet long



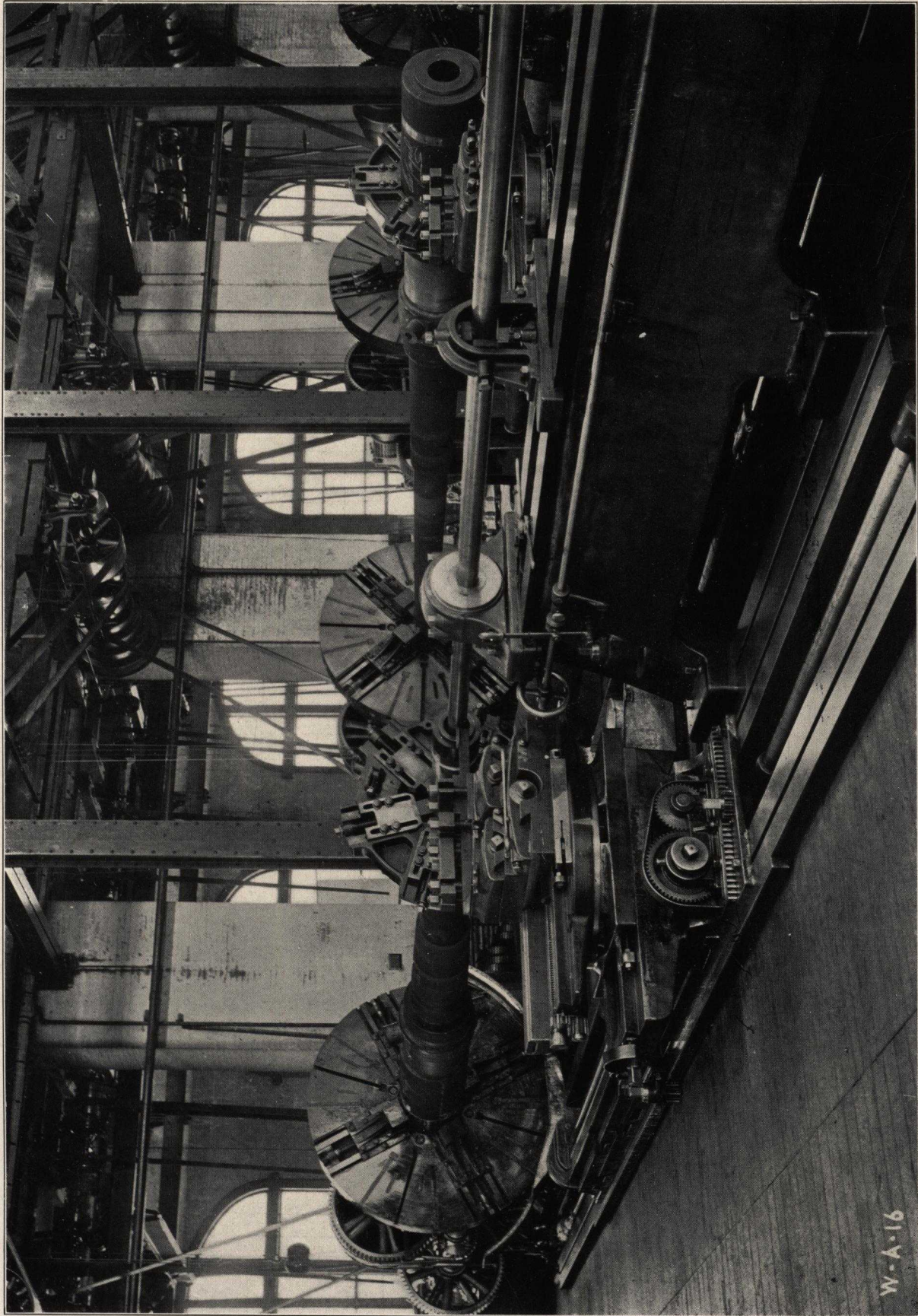
WATERVLIET ARSENAL

96-inch Niles-Bement-Pond Gun Lathe facing the muzzle of a 10-inch breech-loading 1900 model rifle. Muzzle diameter, 21 inches. This gun is about 35 feet long and weighs $34\frac{3}{4}$ tons



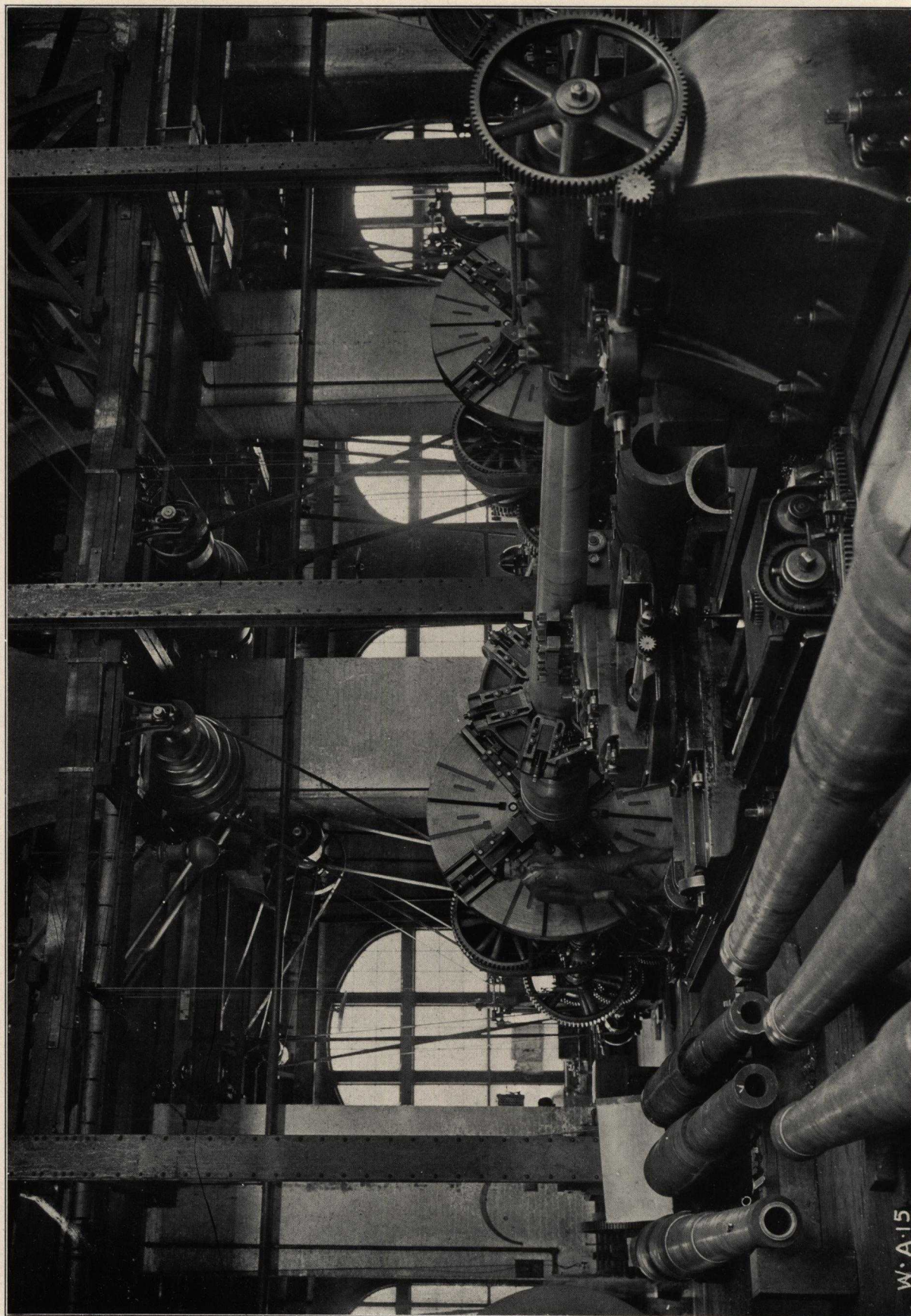
WATERVLIET ARSENAL

96-inch Niles-Bement-Pond Gun Lathe turning up the tube for a 6-inch rapid-fire 1903 model rifle. The tube is 25 feet long and has four shrinking surfaces



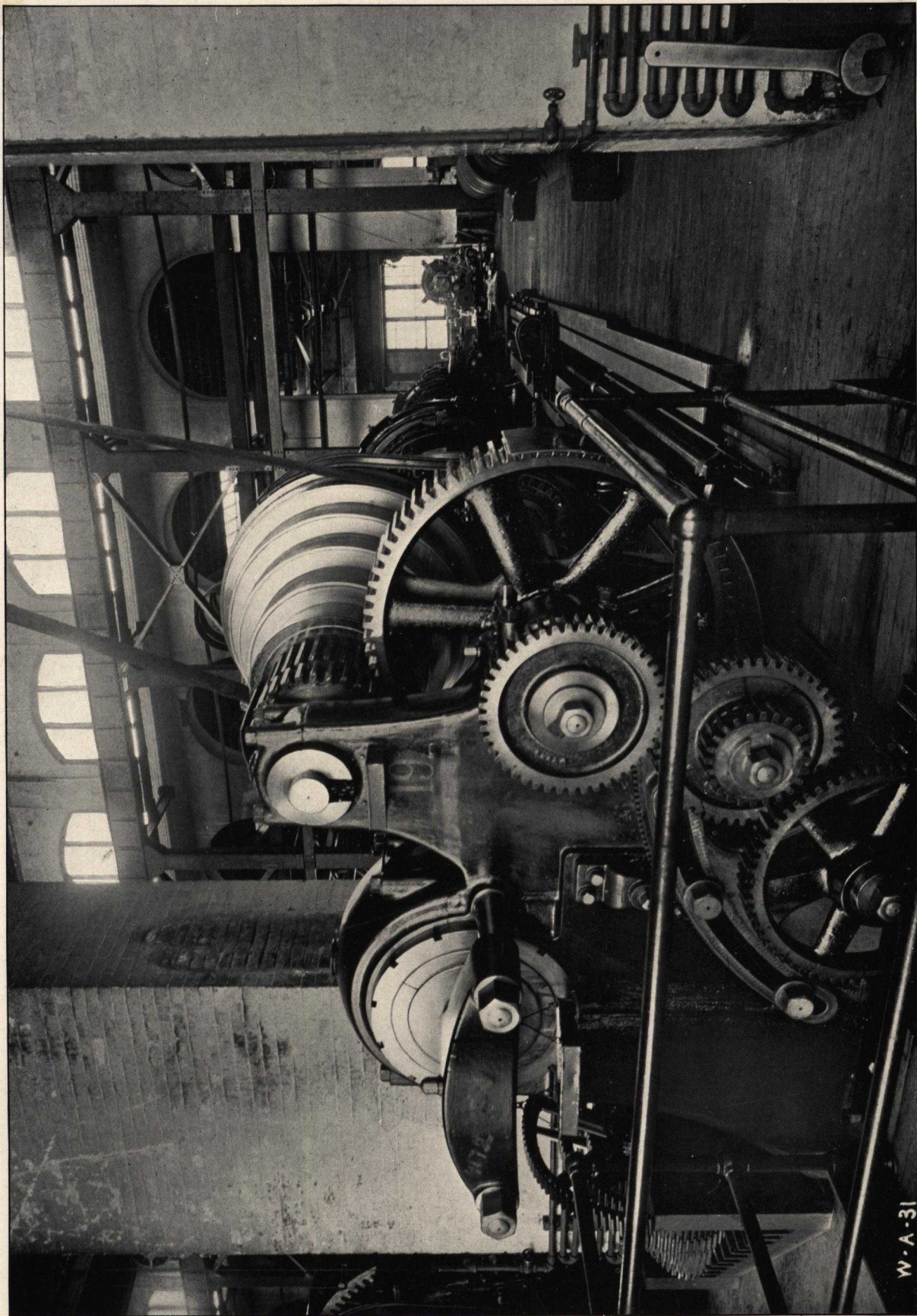
WATERVLLET ARSENAL

96-inch Niles-Bement-Pond Gun Lathe boring a 6-inch rapid-fire rifle. The boring bar is $4\frac{1}{4}$ inches in diameter and carries two tools



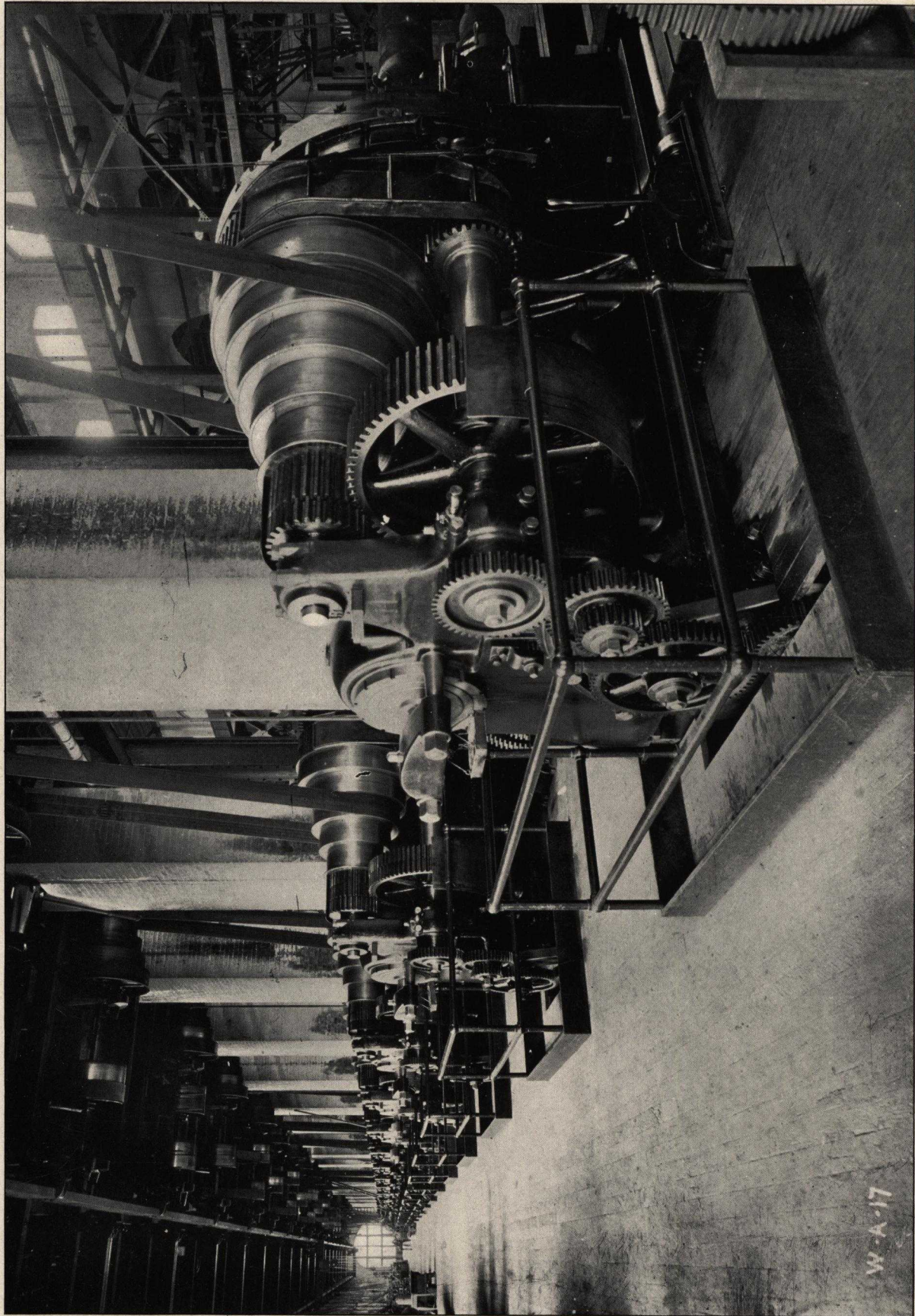
WATERVLIET ARSENAL

96-inch Niles-Bement-Pond Gun Lathe turning up a 1903 model 6-inch rapid-fire gun. The gun is about 25 feet long, 9.8 inches in diameter at the muzzle and 24 inches in diameter at the breech



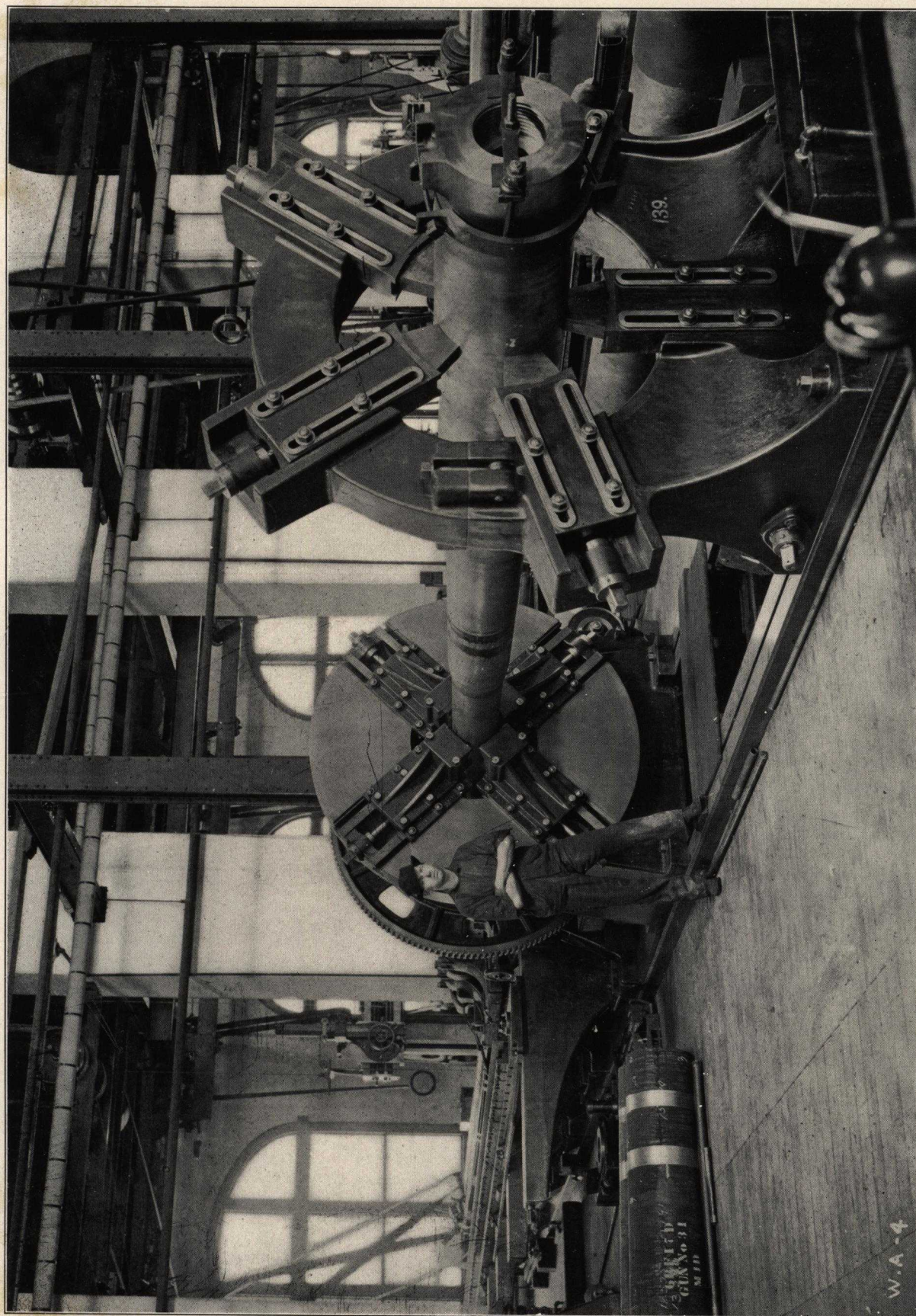
WATERVLIET ARSENAL

View of headstock of the 96-inch Niles-Bement-Pond Gun Lathe. This lathe will take 40 feet between centers. Extreme length, 60 feet



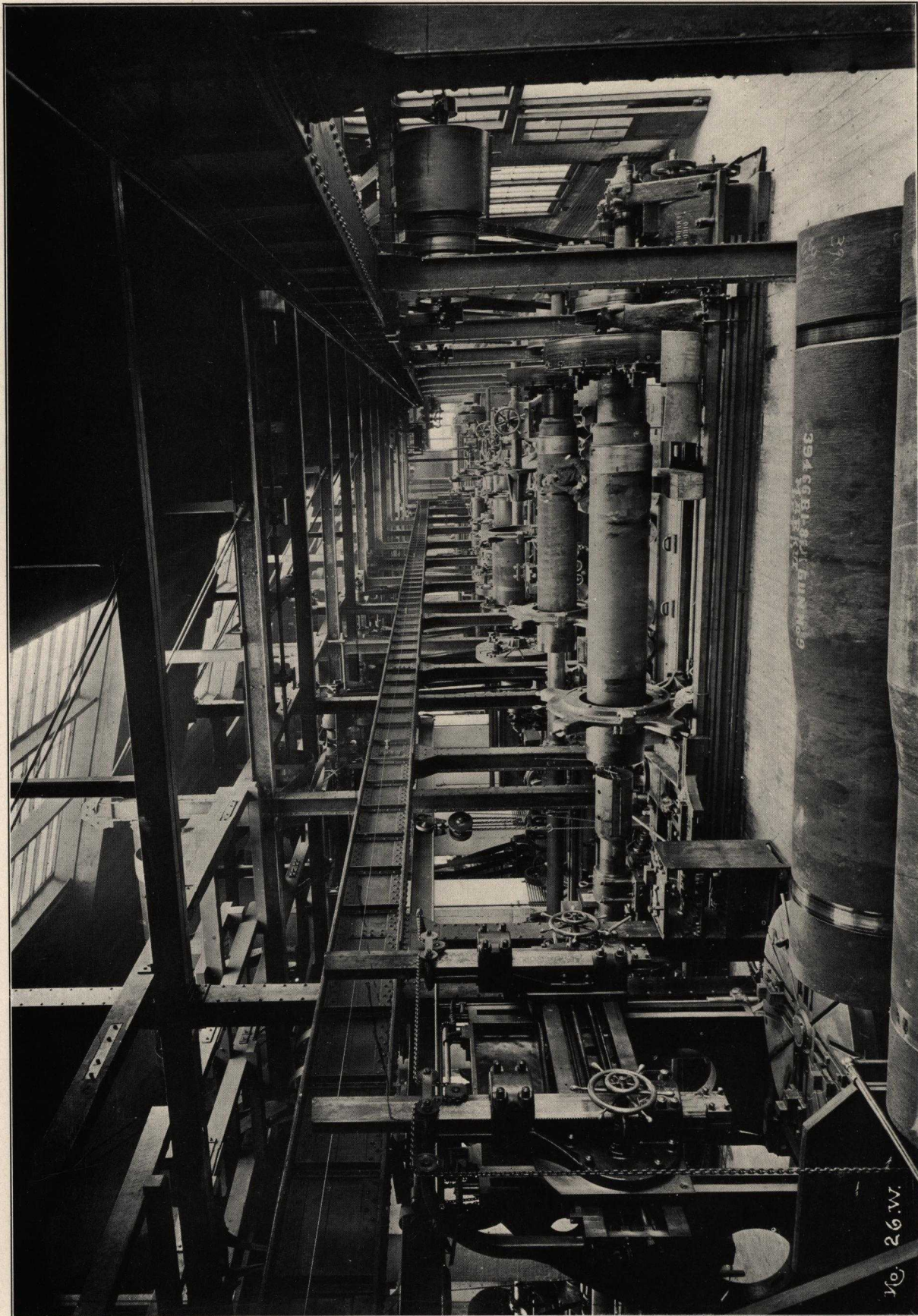
WATERVLIET ARSENAL

View showing the headstocks of thirteen 96-inch Gun Lathes, all built by the Niles-Bement-Pond Company



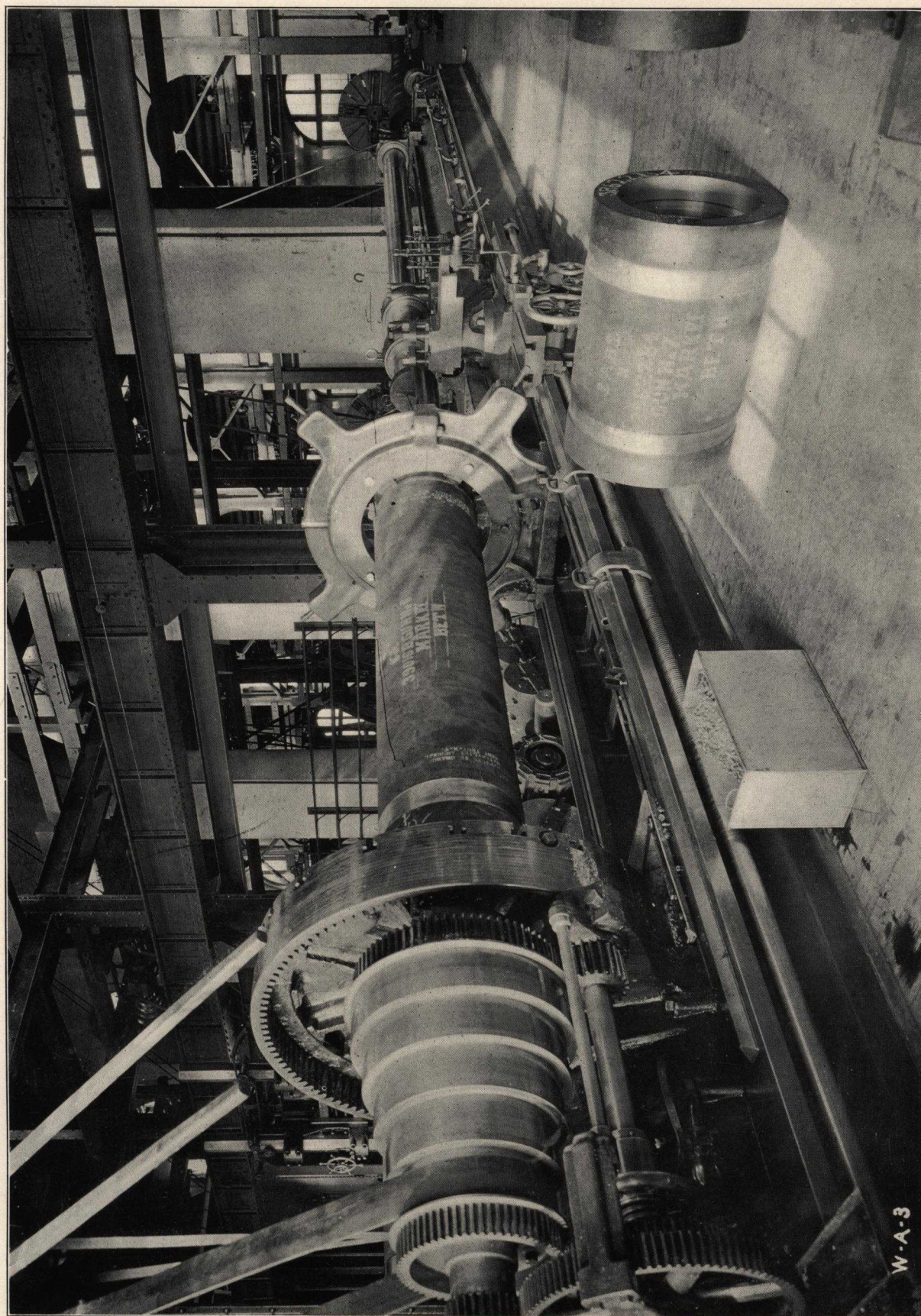
WATERVLIET ARSENAL

Niles-Bement-Pond Rifling Machine rifling a 5-inch rapid-fire gun. Bar travel, 21 feet 8 inches. Machine is 80 feet long. The rifling head carries four tools



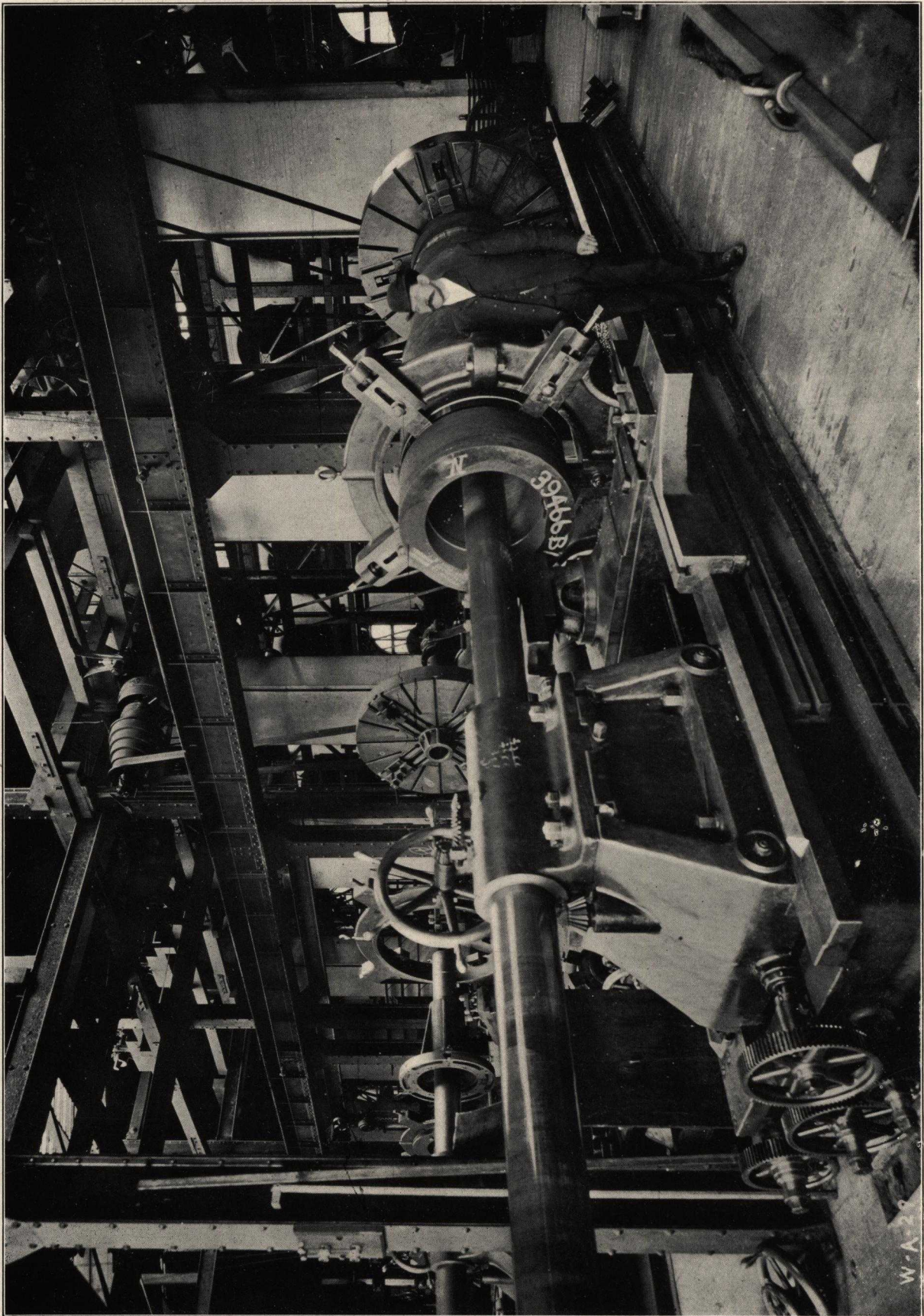
WATERVLIET ARSENAL

View of the Western Bay of the south wing, showing twelve Niles-Bement-Pond Gun Lathes. In the foreground is a Niles 6-foot Mill with chuck jaws for the table

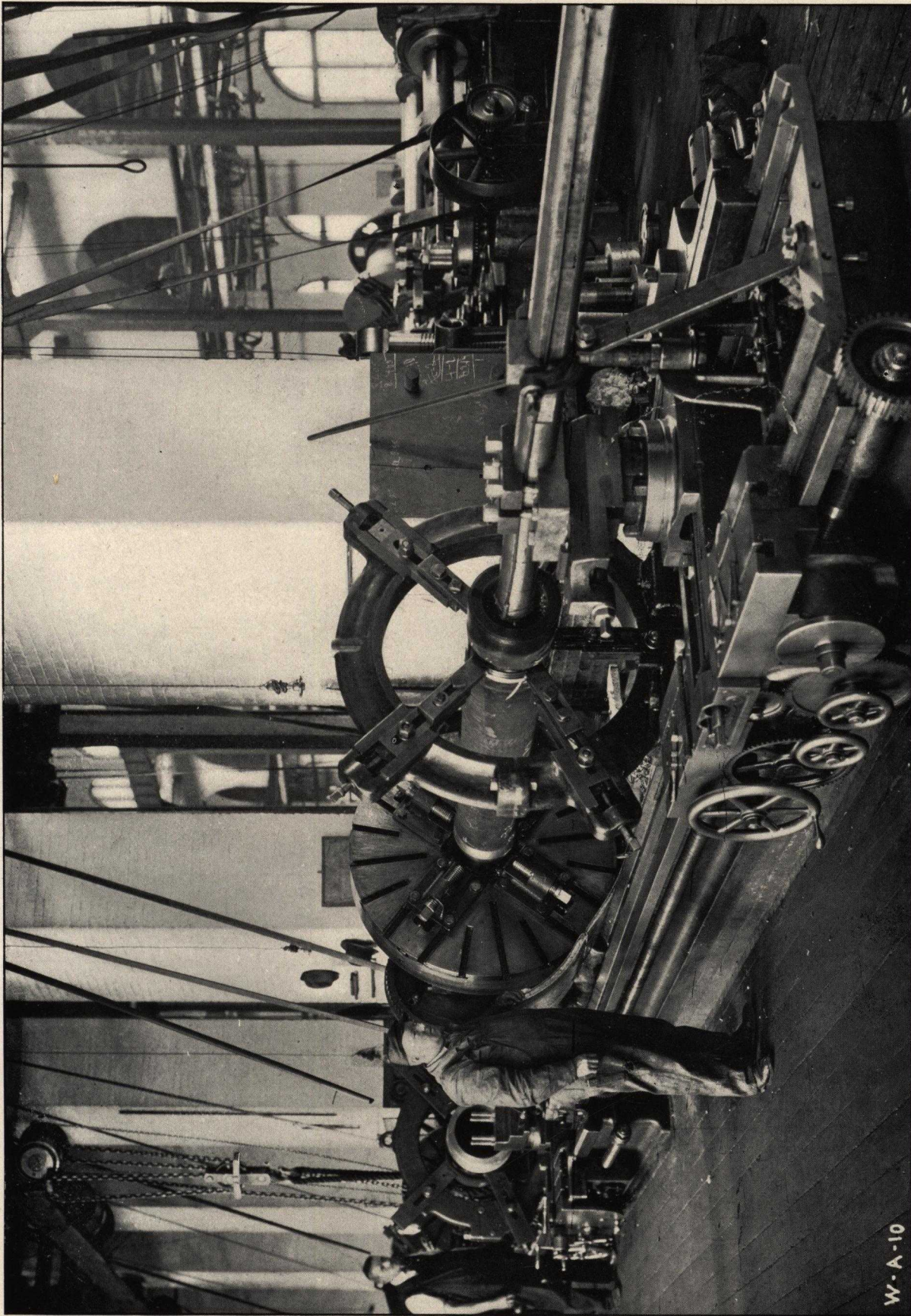


WATERVLIET ARSENAL

60-inch Niles-Bement-Pond Gun Lathe boring the jacket of an 8-inch nickel-steel naval gun. Inside diameter of the jacket, 15 and 16 inches
Length, 160 $\frac{1}{4}$ inches

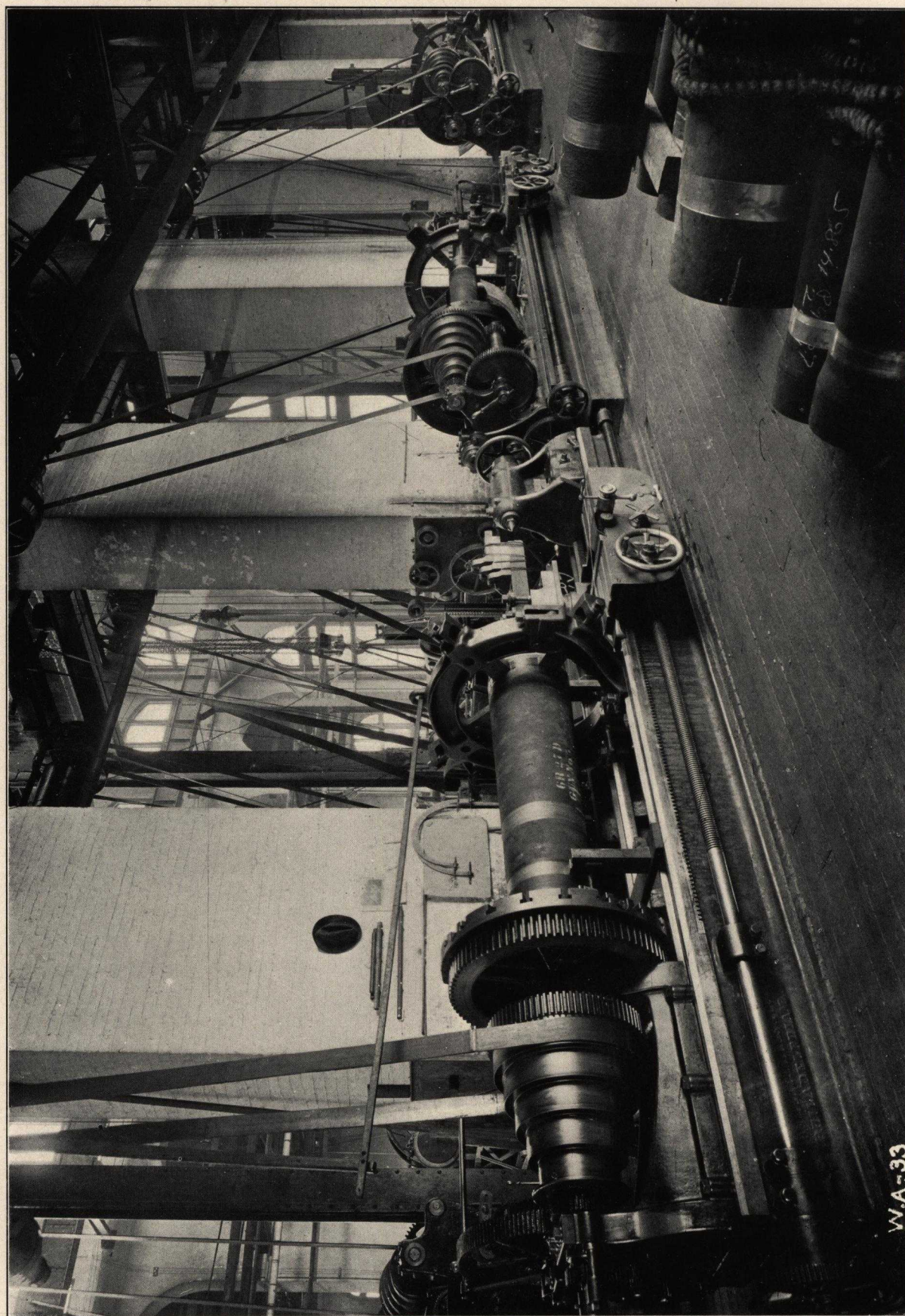


WATERVLIET ARSENAL
48-inch Niles-Bement-Pond Gun Lathe boring the jacket of an 8-inch naval gun



WATERVLIET ARSENAL

Niles-Bement-Pond 48-inch Lathe boring a hoop for a 6-inch rapid-fire rifle. The hoop is about $12\frac{5}{8}$ inches in diameter and $7\frac{1}{2}$ feet long



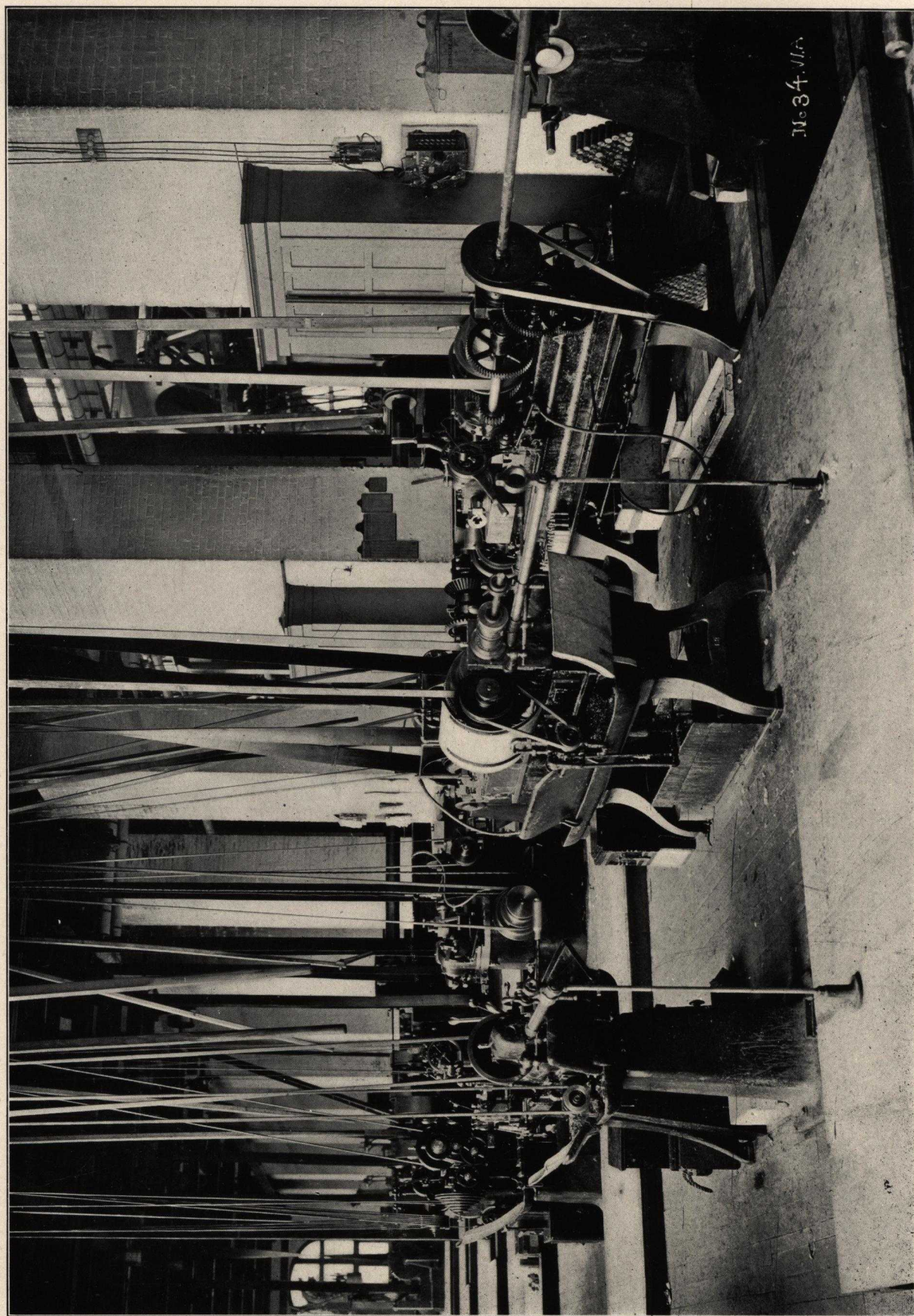
WATERVLIET ARSENAL

Niles-Bement-Pond 42-inch and 48-inch Lathes. The first two lathes are at work on hoops for 6-inch rapid-fire guns. The hoop in the first lathe is about 77 inches long and 18 inches in diameter



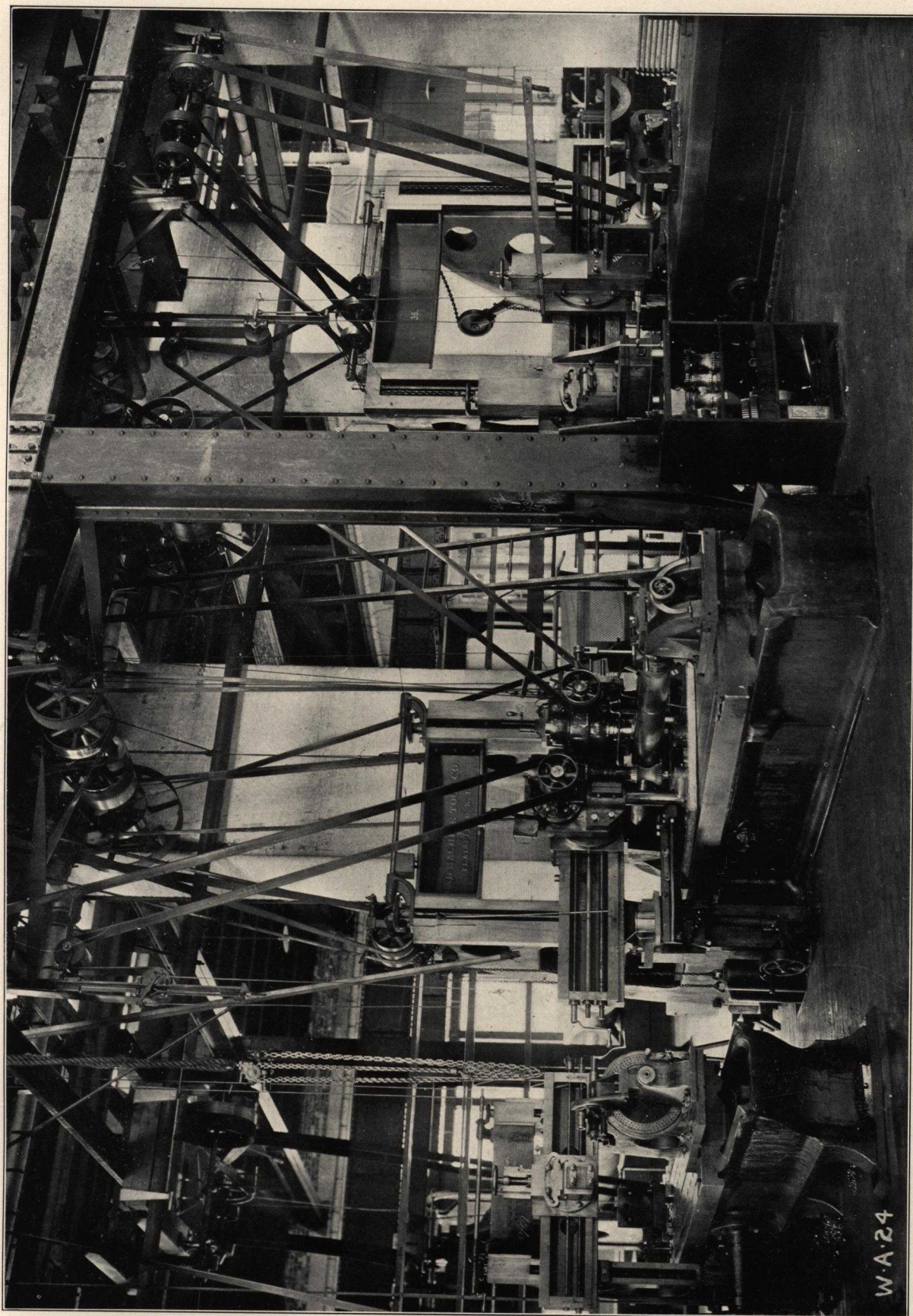
WATERVLIET ARSENAL

A group of 36-inch Niles-Bement-Pond Triple Geared Lathes at work on 3-inch field guns and 75-millimetre Vickers-Maxim guns



WATERVLIET ARSENAL

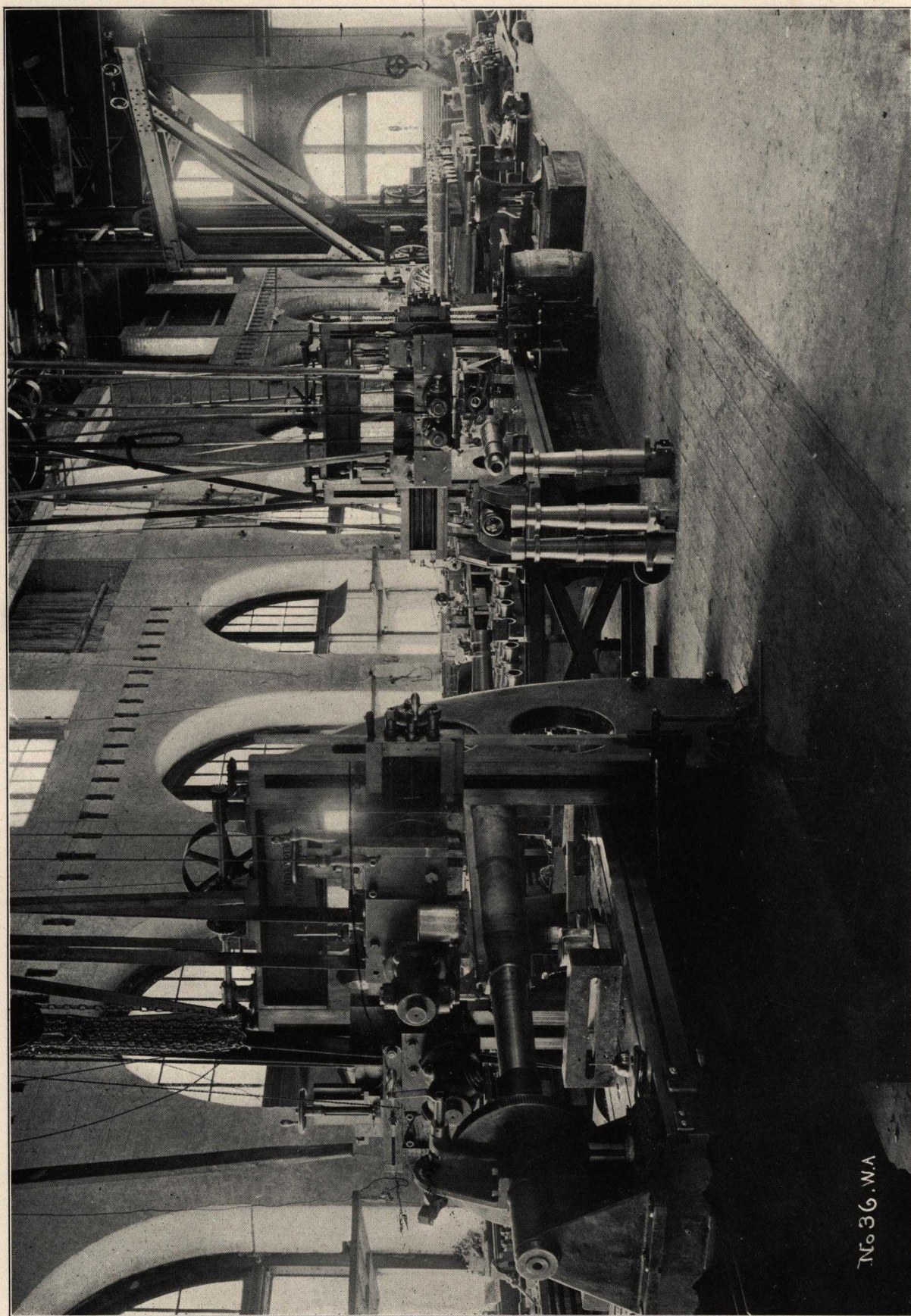
A group of Pratt & Whitney Screw Machines. In the foreground at the left a new model 1 x 10-inch Pratt & Whitney Turret Lathe can be seen, and in the background at the left there is a Pratt & Whitney 6-inch Thread Milling Machine



W.A.24

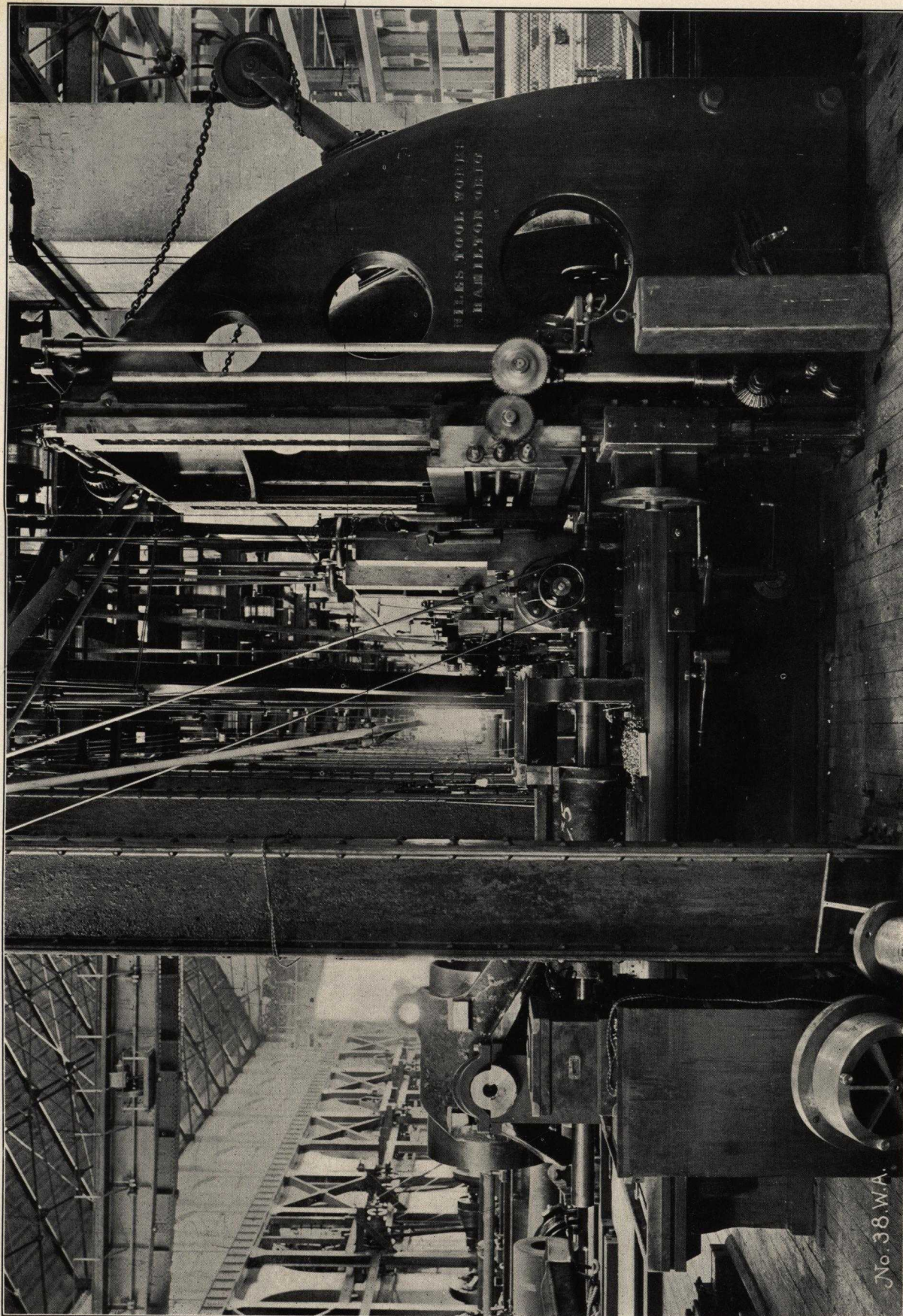
WATERVLiet ARSENAL

Group of Niles-Bement-Pond Planers. Planer at the right is a 72-inch machine with special attachments. The center planer is a 42-inch machine and is rigged for milling, two Gang Milling Cutters being used. The planer at the left is a 30-inch machine and has a jig on the table for rotating gun in planing the breech



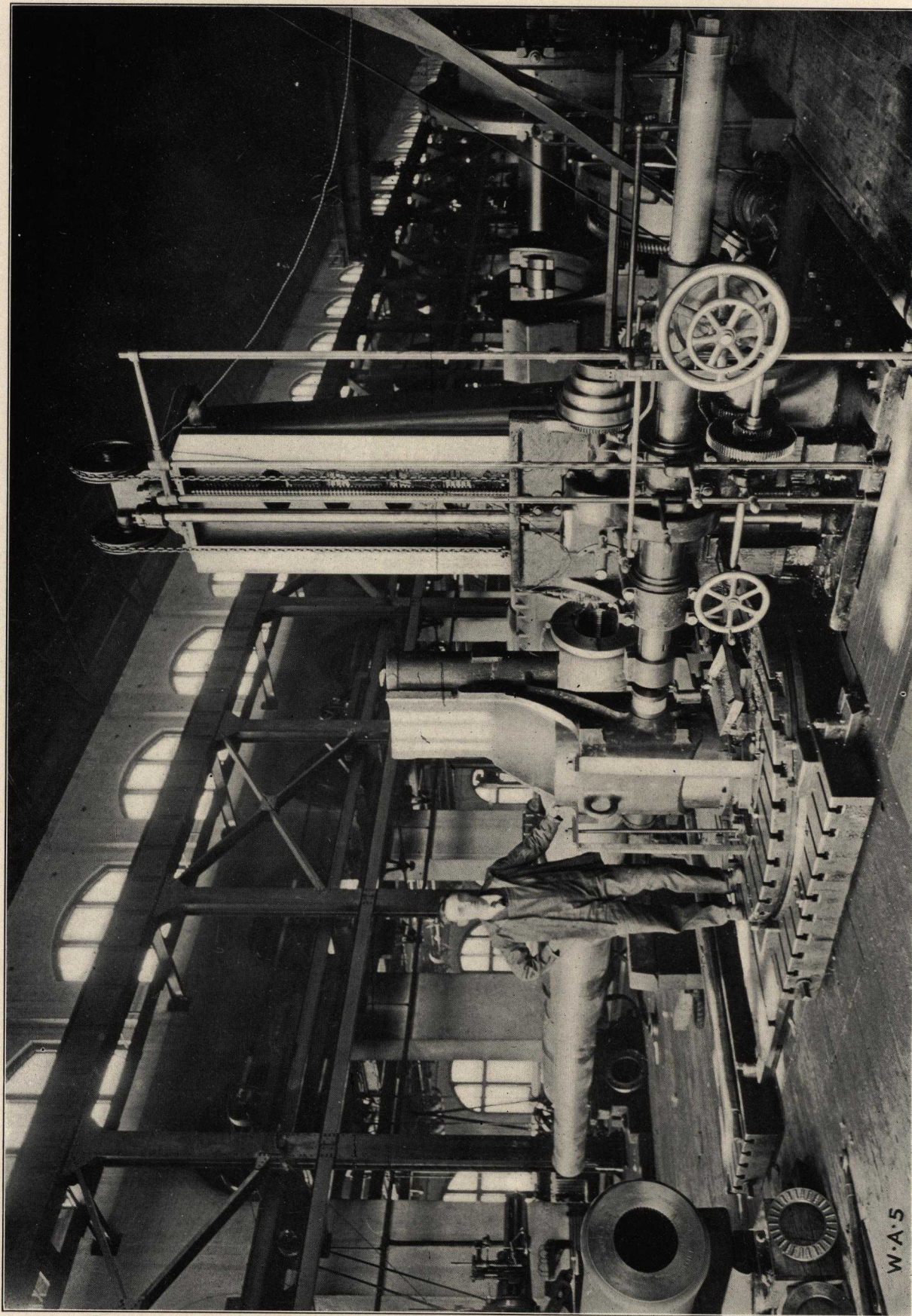
WATERVLIET ARSENAL

38-inch and 42-inch Niles-Bement-Pond Planers rigged for milling recoil slides on 3-inch field guns. The field guns are about 88 inches long, 8 inches in diameter at the breech and 4.8 inches in diameter at the muzzle



WATERVLIET ARSENAL

6-foot Niles-Bement-Pond Planer with special attachments for working on the spring cylinder for cradle for barrette-mounted 6-inch rapid-fire gun



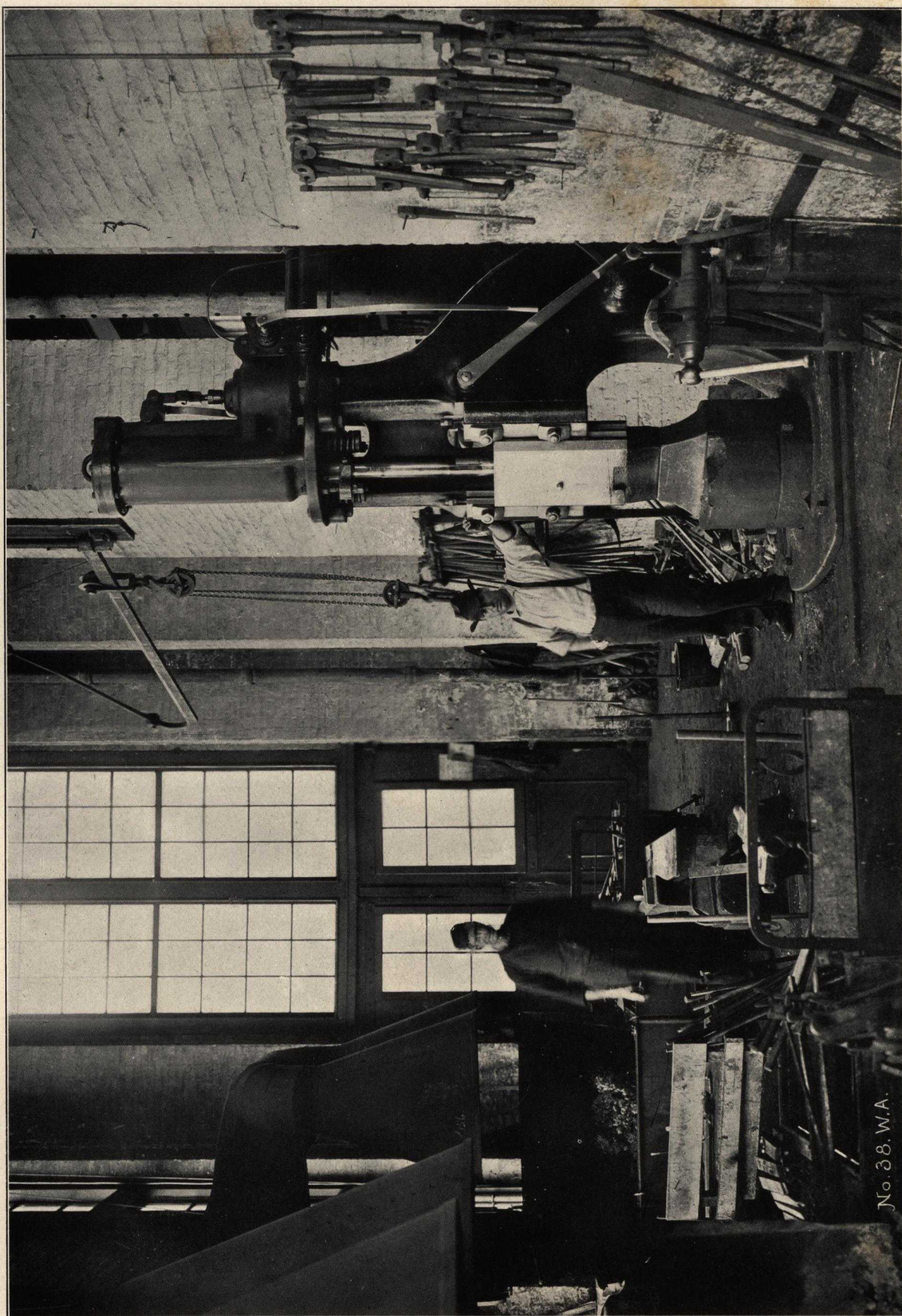
WATERVLIET ARSENAL

Niles-Bement-Pond Horizontal Boring, Drilling and Milling Machine with 6-inch spindle at work turning the trunnions of the cradle for a 6-inch rapid-fire gun carriage. The cradle is mounted on the circular table of the machine and can be conveniently adjusted



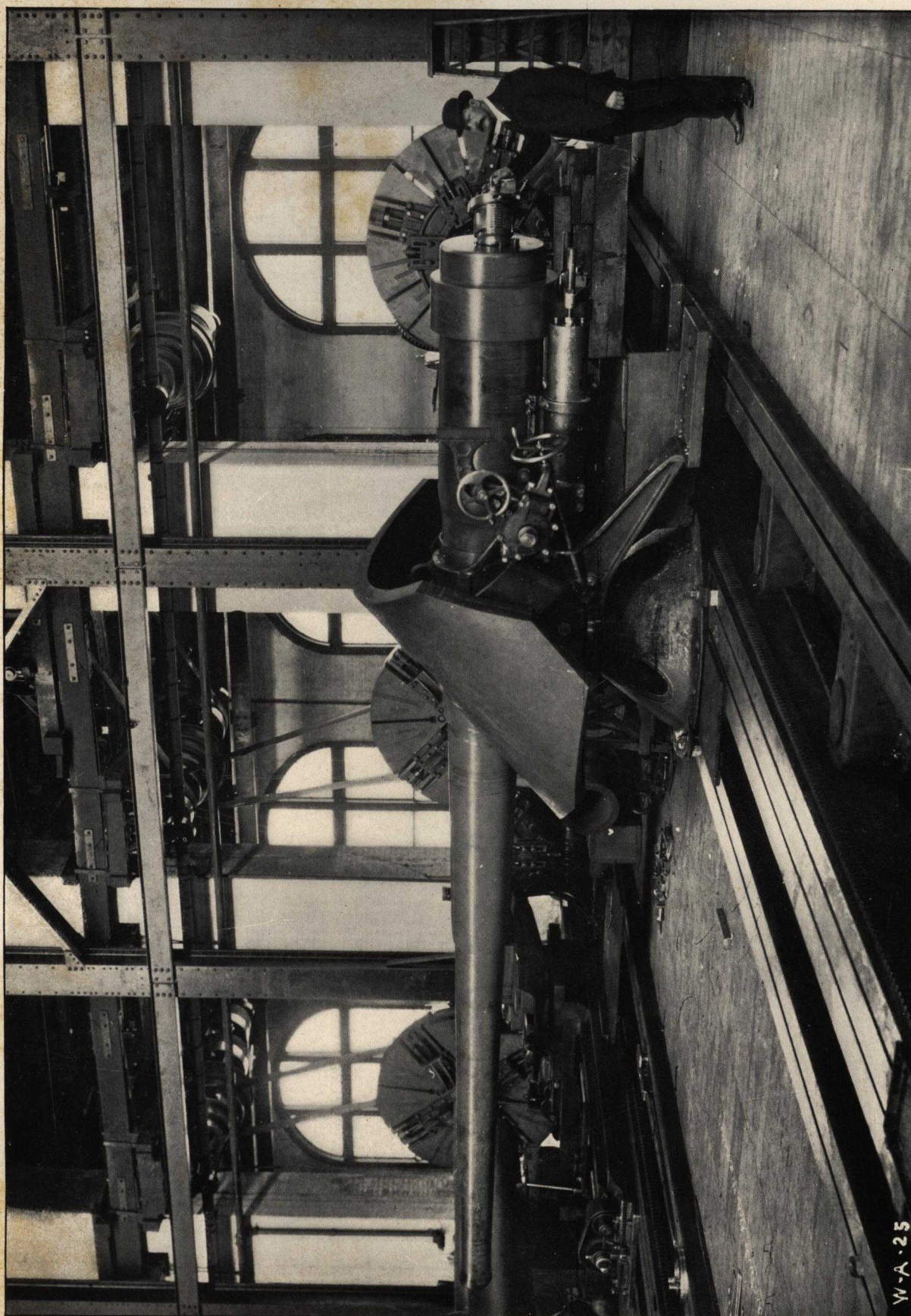
WATERVLIET ARSENAL

Battery of seven 60-inch Niles Boring and Turning Mills, and one 72-inch Niles Boring and Turning Mill at work on nickel-steel recoil bands, cast-steel pedestals for gun carriages and various other work



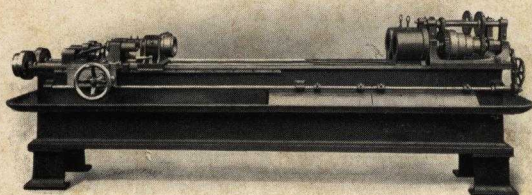
WATERVLIJT ARSENAL

1100-pound Bement Single-frame Steam Hammer for tool making

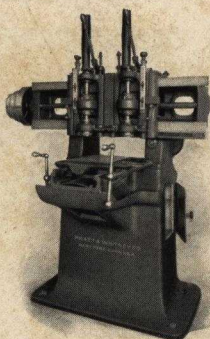


WATERVLIT ARSENAL

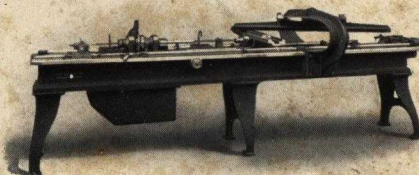
6-inch rapid-fire gun mounted in a barrette carriage. This gun is 310 $\frac{4}{10}$ inches long; has a muzzle diameter of 9 $\frac{8}{10}$ inches and a breech diameter of 24 inches



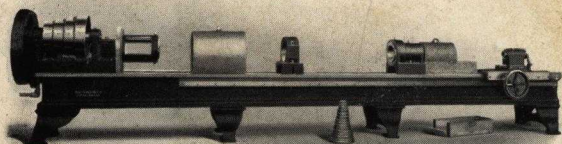
No. 1 1/2 GUN-BARREL DRILLING MACHINE



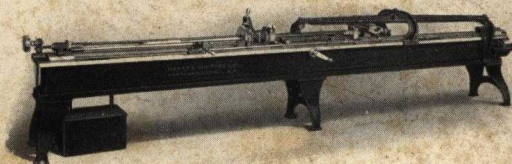
TWO-SPINDLE PROFILING MACHINE



No. 3 RIFLING MACHINE



No. 3 GUN-BARREL DRILLING MACHINE



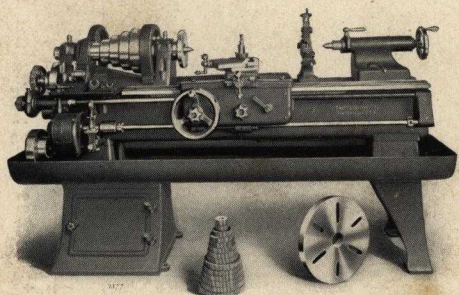
No. 3 1/2 RIFLING MACHINE

ARSENAL MACHINERY

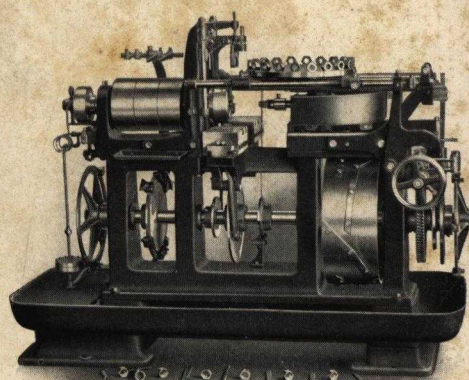
PRATT &
WHITNEY
CO.

HARTFORD, CONN.

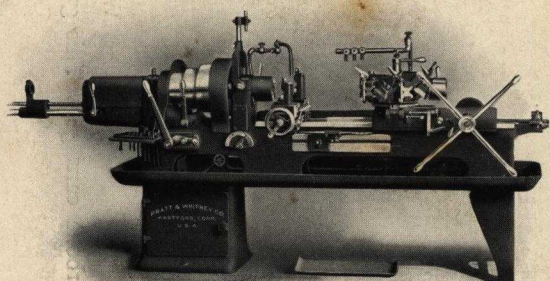
U. S. A.



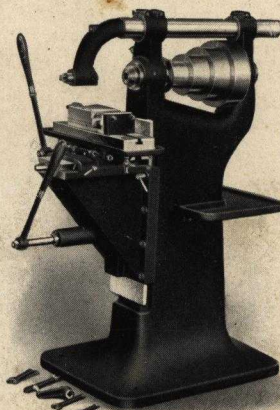
14-INCH ENGINE LATHE



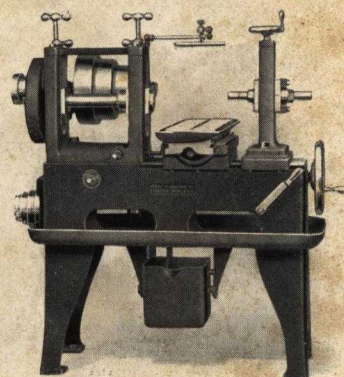
AUTOMATIC SCREW MACHINE WITH DISK
MAGAZINE



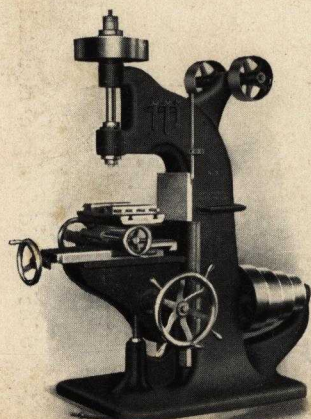
2 x 26-INCH TURRET LATHE



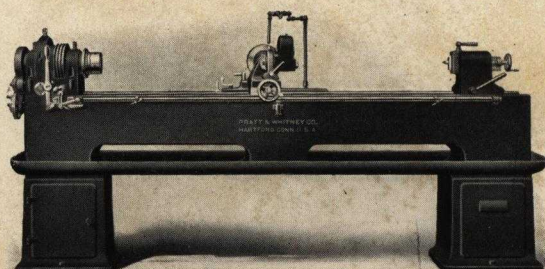
No. 2 HAND MILLING MACHINE



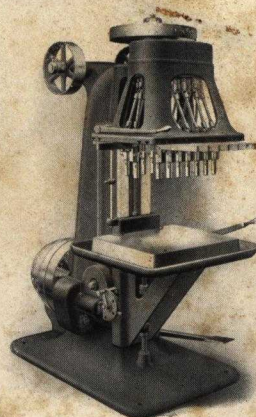
No. 12 LINCOLN MILLING MACHINE



No. 3 DIE-SINKING MACHINE



6 x 80-INCH THREAD MILLING MACHINE



No. 13 ADJUSTABLE MULTI-SPINDLE DRILL

THE
IMPROVED EMERSON
BINDER
PATENT NOV. 27. 00. JULY 28. 03.
OTHER PATENTS PENDING
THE EMERSON BINDING CO.
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